



Translation of the original operating instructions

# Ecotec E3000

Leak Detector

Catalog No.

530-001, 530-002, 530-103, 530-104

From software version

V3.34



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# Table of contents

|  |           |
|--|-----------|
| <b>1 About this manual</b> .....   | <b>6</b>  |
| 1.1 Other associated documents .....   | 6         |
| 1.2 Warnings .....   | 6         |
| 1.3 Target group .....   | 6         |
| <b>2 Safety</b> .....  | <b>7</b>  |
| 2.1 Intended use .....   | 7         |
| 2.2 Owner requirements .....   | 7         |
| 2.3 Operator requirements .....  | 8         |
| 2.4 Dangers .....  | 8         |
| <b>3 Shipment, Transport, Storage</b> .....  | <b>10</b> |
| <b>4 Description</b> .....   | <b>11</b> |
| 4.1 Function and setup of the device .....   | 11        |
| 4.2 Basic unit .....   | 12        |
| 4.3 Sniffer line .....   | 15        |
| 4.4 Technical data .....   | 16        |
| 4.4.1 Mechanical data .....  | 16        |
| 4.4.2 Electrical data .....  | 16        |
| 4.4.3 Physical data .....  | 16        |
| 4.4.4 Ambient conditions .....   | 17        |
| 4.4.5 Factory settings .....   | 17        |
| <b>5 Installation</b> .....  | <b>19</b> |
| 5.1 Setup .....  | 19        |
| 5.2 Connecting the sniffer line .....  | 20        |
| 5.2.1 Replacing the capillary filter of the sniffer probe .....                      | 20        |
| 5.2.1.1 Replacing the plastic capillary filter with the metal capillary filter ..... | 21        |
| 5.2.1.2 Replacing the metal capillary filter with the plastic capillary filter ..... | 21        |
| 5.2.1.3 Install and remove water protection tip .....                                | 22        |
| 5.2.2 Fasten holder for sniffer line .....   | 22        |
| 5.3 Connecting the ECO-Check calibrated leak .....                                   | 23        |
| 5.4 Connecting the external display unit to the Ecotec E3000RC .....                 | 24        |
| 5.5 Connecting IC1000/BM1000 .....   | 24        |
| 5.6 Connecting to the power supply system .....                                      | 24        |
| 5.6.1 Connecting to a PC .....   | 25        |

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|          |   |           |
|----------|---|-----------|
| 5.6.2    | Connecting with a PLC .....   | 25        |
| <b>6</b> | <b>Operation .....</b>  | <b>26</b> |
| 6.1      | Switching on.....   | 26        |
| 6.2      | Operating the device .....  | 27        |
| 6.2.1    | Display and keys.....   | 27        |
| 6.2.1.1  | Recurring function symbols .....  | 27        |
| 6.2.2    | Measurement display elements .....                                      | 29        |
| 6.2.3    | Operating elements and display on the sniffer handle.....               | 31        |
| 6.2.4    | Special features of the Ecotec E3000RC.....                             | 31        |
| 6.3      | Basic settings .....  | 32        |
| 6.3.1    | Miscellaneous .....   | 32        |
| 6.3.2    | Audio settings .....  | 34        |
| 6.3.3    | Display settings.....   | 35        |
| 6.3.3.1  | Gas display handle .....  | 36        |
| 6.3.4    | Vacuum & access control .....   | 36        |
| 6.3.5    | Interfaces .....  | 38        |
| 6.4      | Settings for the measurements .....                                     | 39        |
| 6.4.1    | Selecting the gas, changing gas parameters, activating measurement..... | 40        |
| 6.4.2    | Calibrate.....  | 43        |
| 6.4.2.1  | Internal calibration with ECO-Check.....                                | 44        |
| 6.4.2.2  | External calibration with external calibrated leak.....                 | 45        |
| 6.4.3    | Gas equivalent to helium and hydrogen, settings for diluted gas .....   | 46        |
| 6.4.4    | Suppress interfering gases .....  | 48        |
| 6.4.5    | Setting Custom Gas.....   | 49        |
| 6.4.6    | Measure .....   | 50        |
| 6.4.6.1  | Calling up information on the measurement.....                          | 51        |
| 6.4.7    | Measuring with I•Guide.....   | 52        |
| 6.4.7.1  | Setting the I•Guide program .....                                       | 53        |
| 6.4.7.2  | Starting the I•Guide program .....                                      | 54        |
| 6.5      | Idle state (sleep).....   | 57        |
| 6.6      | SERVICE .....   | 57        |
| 6.7      | Retrieve information about the device.....                              | 57        |
| 6.8      | Special features of individual gases .....                              | 61        |
| 6.9      | Switch off.....   | 63        |
| <b>7</b> | <b>Warning and error messages.....</b>                                  | <b>64</b> |
| <b>8</b> | <b>Maintenance .....</b>  | <b>71</b> |

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|           |  |            |
|-----------|--|------------|
| 8.1       | Calling up and managing maintenance information .....                                    | 71         |
| 8.2       | Maintenance work .....   | 74         |
| 8.2.1     | Maintenance plan.....  | 76         |
| 8.2.2     | Replacing the air filter of the main unit.....   | 77         |
| 8.2.3     | Replace operating fluid reservoir. ....  | 78         |
| 8.2.4     | Replace mains fuses.....   | 79         |
| 8.2.5     | Replacing the filter inserts of the capillary filter and the water conservation tip..... | 80         |
| 8.2.6     | Replacing the sinter filter of the sniffer handle.....                                   | 82         |
| <b>9</b>  | <b>Decommissioning .....</b>   | <b>83</b>  |
| 9.1       | Disposing of the device .....  | 83         |
| 9.2       | Returning the device for maintenance, repair or disposal.....                            | 83         |
| <b>10</b> | <b>Appendix .....</b>  | <b>85</b>  |
| 10.1      | Accessories.....   | 85         |
| 10.2      | Gas library.....   | 87         |
| 10.3      | Menu tree .....  | 96         |
| 10.4      | CE Declaration of Conformity.....  | 99         |
|           | <b>Index .....</b>   | <b>100</b> |

# 1 About this manual

This document applies to the software version stated on the title page.

## 1.1 Other associated documents

| Name                          | Document number |
|-------------------------------|-----------------|
| ECO-Check Installation Manual | liqa10          |
| Interface description         | kina22          |

## 1.2 Warnings

### **DANGER**

**Imminent hazard resulting in death or serious injuries**

### **WARNING**

**Hazardous situation resulting in potential death or serious injuries**

### **CAUTION**

**Hazardous situation resulting in minor injuries**

### **NOTICE**

**Hazardous situation resulting in damage to property or the environment**

## 1.3 Target group

These operating instructions are intended for the owner of the leak detection unit E3000 and for technically qualified personnel with experience in leak detection technology and integration of leak detection devices in leak detection systems.

## 2 Safety

### 2.1 Intended use

The device is a leak detector for sniffer leak detection. With the device you locate and quantify leaks on test objects. The device sniffs for light gases, refrigerants and natural gases. The test objects must contain the gas under overpressure. The outsides of the test objects are checked for escaping gas with a sniffer line (sniffing method). The sniffer line is available as an accessory, see "Accessories [▶ 85]."

- You must install, operate and service the device only in compliance with these operating instructions.
- Adhere to the restrictions of use, see "Technical data [▶ 16]."
- Only use the device away from areas with a risk of explosions.
- Do not suck up liquids with the instrument.
- Never hold the sniffer tip into liquids but sniff only for gases. To sniff test objects that have low surface moisture, such as condensation moisture, use the water protection tip.

#### Incorrect usage

### 2.2 Owner requirements

#### Safety-conscious operation

- Operate the device only when it is in technically perfect working order.
- Only use original parts or parts approved by the manufacturer.
- Keep this instruction manual available on site.
- Do not touch any live parts with the sniffer tip.
- Sniffing unspecified and aggressive gases.
- Only operate the device properly in accordance with this instruction manual, in a safety and risk conscious manner.
- Adhere to the following regulations and observe their compliance:
  - Intended use
  - General applicable safety and accident prevention regulations
  - International, national and local standards and guidelines
  - Additional device-related provisions and regulations

#### Personnel qualifications

- Allow only qualified service technicians to work with and on the device. The qualified service technicians must have received training on the device.

- Personnel to be trained must only work with and on the device under the supervision of trained, specialist technical personnel.
- Make sure that authorized personnel have read and understood the operating instructions and all other applicable documents, see "Other associated documents [▶ 6]," especially the information on safety, maintenance and repairs, before starting work.
- Regulate the responsibilities, authorizations and supervision of personnel.

## 2.3 Operator requirements

- Read, observe and follow the information in these operating instructions and the working instructions created by the owner, especially the safety instructions and warnings.
- Carry out any work only based on the complete operating instructions.
- If you have any questions regarding operating or maintenance that is not explained in this manual, then please contact INFICON customer services.

## 2.4 Dangers

The measuring instrument was built according to the state-of-the-art and the recognized safety regulations. Nevertheless, improper use may result in risk to life and limb on the part of the user or third parties, or damage to the instrument or other property may occur.

### **Danger due to use in EX/ATEX areas**

If the workplace is classified as a hazardous area according to Ex/ATEX regulations it is mandatory to apply Ex/ATEX certified equipment.

Ecotec E3000 including INFICON sniffer lines are **not EX/ATEX** certified.

In risk-free areas and non-classified environments Ecotec E3000 can be safely used.

The major risk associated with the leak detector is always the atmosphere around and inside the instrument enclosure and not the gas aspirated by the sniffer into the interior of the detector.

### **Dangers from electric power**

The device is operated with electrical voltages of up to 236V. Touching parts where electrical voltage is present can result in death.

- ▶ Disconnect the device from the power supply prior to any installation and maintenance work. Ensure that the electrical supply cannot be switched back on unintentionally.

Touching live parts with the sniffer tip can result in death.

- ▶ Before starting the leak test, disconnect electrically operated test objects from the power supply. Ensure that the electrical supply cannot be switched back on unintentionally.

The device contains electric components that can be damaged from high electric voltage.

- ▶ Before connecting the device to the power supply, make sure that the supply voltage specified on the device is the same as the local power supply.

**Hazards due to liquids and chemicals**

Liquids and chemical substances can damage the instrument.

- Adhere to the restrictions of use, see "Technical data [▶ 16]."
- Do not suck up liquids with the instrument.
- Never try to find toxic, caustic, microbiological, explosive, radioactive or other harmful substances with the device.
- You must not smoke near the device. Do not expose the instrument to a naked flame and avoid spark formation.

**Dangers from strong exposure to light**

Exposure of the eyes to LED light can lead to lasting eye damage.

- Do not look into the LEDs of the sniffer handle from a short distance or for a longer period of time.

## 3 Shipment, Transport, Storage

| Item                           | Quantity |
|--------------------------------|----------|
| Ecotec E3000 (basic unit)      | 1        |
| Power supply cable, 3 m length | 1        |
| Fuses                          | 80       |
| Replacement air filter         | 1        |
| 8 mm Allen wrench              | 1        |
| 19 mm box wrench               | 1        |
| Operating manual               | 1        |
| Interface description          | 1        |

Table 1: Scope of delivery

- ▶ Check the scope of delivery of the product for completeness after receipt.

Must be ordered separately

- Sniffer lines with the desired length must be ordered separately,
- ECO-Check calibrated leak,
- for device version E3000RC: Display and connecting cable.

Accessory list: see "Accessories [▶ 85]."

### Transport

#### NOTICE

Transport in unsuitable packaging material can damage the device. Parts inside the device can be damaged during transportation without transport restraint.

- ▶ Keep the original packaging.
- ▶ Transport the device only in the original packaging.
- ▶ Screw the transport restraint into the device floor before transportation, see "Setup [▶ 19]."

Always store the device in compliance with the technical data, see Technical data [▶ 16].

#### See also

- 📖 Setup [▶ 19]

## 4 Description

### 4.1 Function and setup of the device

The Ecotec E3000 is comprised of main unit and sniffer line. The Ecotec E3000 can verify and quantify gases sucked in by the sniffer line with the help of a selective mass spectrometer.

Working in the Ecotec E3000:

- a Quadrupol mass spectrometer as a detection system
- a high-vacuum pump system
- an inlet system for the gas flow
- electrical and electronic sub-assemblies for electrical power supply and signal processing

The mass spectrometer works under high vacuum, i.e. the pressure in the mass spectrometer must always be below  $10^{-4}$  mbar. This vacuum is created by the turbo molecular pump with the help of a diaphragm pump.

## 4.2 Basic unit

The basic unit is only called a “device” in the following as long as the meaning remains clear.



Fig. 1: Ecotec E3000 Front view

|   |                                  |   |   |
|---|----------------------------------|---|---|
| 1 | Display                          | 4 | ECO-Check calibrated leak               |
| 2 | Handles and ventilation openings | 5 | Lemo plug-in connector for sniffer line |
| 3 | Speaker                          |   |   |

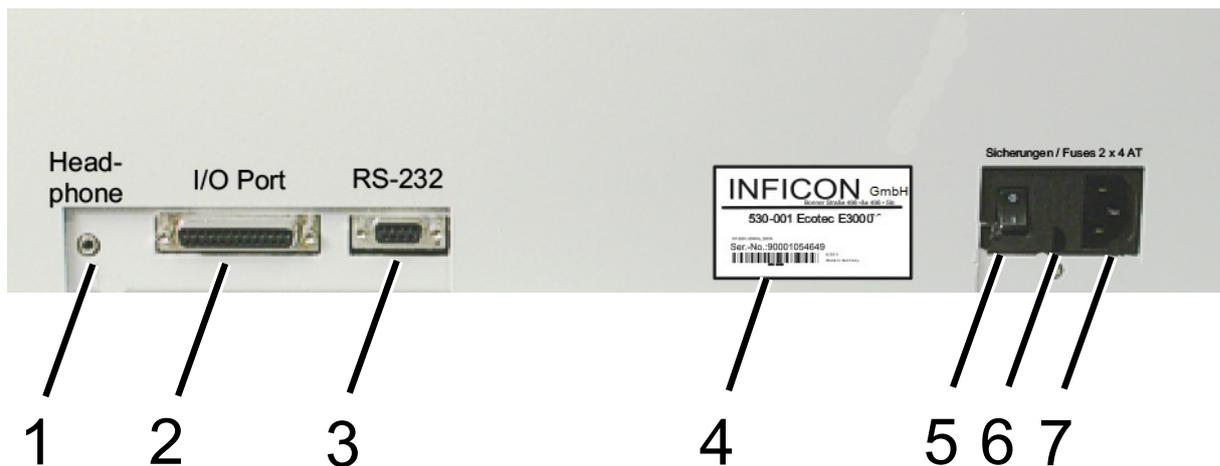


Fig. 2: Ecotec E3000 rear view

|   |                                   |   |                    |
|---|-----------------------------------|---|--------------------|
| 1 | Headphone connection, 3.5 mm jack | 5 | Power switch       |
| 2 | Inputs/outputs (I/O port)         | 6 | Fuses behind cover |
| 3 | RS-232 connection                 | 7 | Power supply       |
| 4 | Nameplate                         |   |                    |

Headphone connection, 3.5 mm jack:

In order to better hear signals in a loud environment, you can connect headphones.

Inputs/outputs (I/O port):

The I/O port enables communication with a PLC. Some functions of the Ecotec E3000 can be controlled from the outside and measurement results and device states of the Ecotec E3000 can be transmitted to the outside.

Relay changeover contacts allow monitoring of the trigger values and the operating status of the Ecotec E3000. Please refer to the “Interface description Ecotec E3000” (doc. no. kins22e1) for further information.

RS-232 connection:

A PC can read out all data and measurement results of the device and control the device via the RS-232 connection. Please refer to the “Interface description Ecotec E3000” (doc. no. kins22e1) for further information.

Nameplate:

The rating plate contains the supply voltage specification and other information with which the device can be clearly identified.



Fig. 3: Nameplate of Ecotec E3000

|   |                |   |                 |
|---|----------------|---|-----------------|
| 1 | Serial number  | 3 | Production date |
| 2 | Supply voltage |   |                 |

Power switch:

The power switch is used to switch the device on and off.

Fuses behind cover:

For information on replacing the fuses, see "Replace mains fuses. [▶ 79]."

Power supply:

For information on the power connection as well as the labeling on the power connection (nameplate), see "Technical data [▶ 16]."

## 4.3 Sniffer line

You need a sniffer line to operate the device.

Sniffer lines are available in four lengths: 3 m, 5 m, 10 m and 15 m. The sniffer line consists of a hose (multifunction cable), a handle with controls (sniffer handle) and a sniffer tip.

There is a special sniffer line for robot applications, see "Accessories [▶ 85]."

### Sniffer tip

There are rigid and flexible sniffer tips with different lengths.

### Sniffer handle

The display on the sniffer handle shows current information on the measuring process.

### Display and functions

You can operate functions frequently used during measurement with both buttons.

LEDs inserted in the handle illuminate the test area.



Fig. 4: Sniffer handle Display and functions

|   |                |   |                   |
|---|----------------|---|-------------------|
| 1 | Display        | 4 | I•Guide operation |
| 2 | LEDs           | 5 | ZERO alignment    |
| 3 | Speaker (rear) |   |                   |

If the measuring value limit is exceeded, the display switches from green to red. You can additionally set one speaker in the handle to output a signal and the LEDs in the handle to flash or shine with maximum brightness, see "Basic settings [▶ 32]."

## 4.4 Technical data

### 4.4.1 Mechanical data

| Ecotec E3000           |                       |
|------------------------|-----------------------|
| Dimensions (W x H x D) | 610mm x 370mm x 265mm |
| Weight                 | 34 kg                 |

### 4.4.2 Electrical data

| Ecotec E3000                         |  |
|--------------------------------------|--|
| Mains voltages and mains frequencies | 100 - 120 V $\pm$ 10%, 50 / 60 Hz<br>207 - 236 V $\pm$ 10%, 50 / 60 Hz |
| Power consumption                    | 200 VA   |
| Protection class                     | EN 60529 IP20<br>UL 50E type 1   |
| Overvoltage category                 | II   |
| Fuses                                | 2 x 4 A slow-blow  |
| Power supply cable                   | 2.5 m  |
| Noise level                          | < 54 dBA   |

### 4.4.3 Physical data

| Ecotec E3000   |                                 |
|--|---------------------------------|
| Minimum detectable leak rate   |                                 |
| R134a  | 0.05g/a (0.002 oz/yr)           |
| R600a  | 0.05g/a (0.002 oz/yr)           |
| Helium   | < 1 x 10 <sup>-6</sup> mbar l/s |
| Measurement range  | 6 decades                       |
| Detectable masses  | 2 to 200 amu                    |
| Mass spectrometer  | Quadrupole mass spectrometer    |
| Ion source   | 2 cathodes                      |
| Time constant of the leak rate signal  | < 1 s                           |
| Gas flow through the capillary measured at 1 atm (1013 mbar) at sea level. The flow rate changes with the geographical height and barometric pressure. | 120 to 200 sccm                 |
| Time until ready for operation   | < 2 min                         |
| Response time  |                                 |

| <b>Ecotec E3000</b> |             |
|---------------------|-------------|
| 3 m sniffer line    | 0.7 seconds |
| 5 m sniffer line    | 0.9 seconds |
| 10 m sniffer line   | 1.4 seconds |
| 15 m sniffer line   | 3.0 seconds |
|                     |             |

#### 4.4.4 Ambient conditions

| <b>Ecotec E3000</b>                                |  |
|--|--|
| Permissible ambient temperature (during operation) | 10 °C to 45 °C                             |
| Permissible storage temperature                    | -20 °C to 60 °C                            |
| Max. relative humidity up to 31°C                  | 80%  |
| Max. relative humidity from 31°C to 40°C           | Decreasing on linear basis from 80% to 50% |
| Max. relative humidity above 40 °C                 | 50%  |
| Degree of contamination                            | II   |
| Max. altitude above sea level                      | 2000 m                                     |

#### 4.4.5 Factory settings

| <b>Ecotec E3000</b>                  |  |
|--------------------------------------|--|
| Alarm profile                        | Trigger alarm                            |
| Alarm delay                          | Deactivated                              |
| Number of measuring points (I•Guide) | 4  |
| Internal                             | Activated                                |
| Recording output                     | Activated                                |
| Auto                                 | Auto                                     |
| Baud rate and blank flange           | 9600 CR+LF                               |
| Pressure unit                        | mbar                                     |
| Flow rate                            |  |
| Lower limit                          | 100 sccm                                 |
| Upper limit                          | 250 sccm                                 |
| Sensitivity test                     | Activated                                |
| Gas, definition                      | Gas 1, gas 2, gas 3, gas 4, gas 5, gas 6 |
| Device speaker                       | Activated                                |
| Handle speaker                       | Trigger value                            |
| Cathode Selection                    | A  |

| <b>Ecotec E3000</b>              |                           |
|----------------------------------|---------------------------|
| I•Guide                          | Deactivated               |
| Calibration (cal), internal      | Activated                 |
| Contrast                         | Not inverted, setting 30  |
| Volume                           | 2                         |
| Minimum volume                   | 2                         |
| Leak rate, selected, highest     | Automatic                 |
| Leak rate filter                 | I-Filter                  |
| Menu PIN                         | Deactivated, 0000         |
| Measurement time (I•Guide)       | 1 second                  |
| Measuring mass                   | 69                        |
| Peak value                       | Deactivated, 5 seconds    |
| ECO-Check                        | Activated                 |
| Relay outputs                    | see interface description |
| RS-232 protocol                  | ASCII                     |
| Sniffer tip, light               | Activated, Level 4        |
| Sniffer tip, filter, maintenance | 100 hours                 |
| Recorder, gas                    | Auto                      |
| Scaling of the recorder          | logarithmic               |
| Language                         | English                   |
| PLC outputs and inputs           | see interface description |
| Control location                 | Local and RS-232          |
| Search threshold                 | 90%                       |
| Trigger value, sum (I•Guide)     | 10 g/a                    |
| Trigger and unit                 | 4 g/a                     |
| Idle time (I•Guide)              | 3 seconds                 |
| Maintenance, sniffer tip filter  | 100 hours                 |
| ZERO time                        | 5 seconds                 |
| ZERO button sniffer line         | Activated                 |
| ZERO button basic unit           | Activated                 |

# 5 Installation

## 5.1 Setup

### DANGER

#### **Danger from moisture and electricity**

Moisture entering the device can lead to personal injury due to electric shocks as well as damage to property due to short circuiting.

- ▶ Operate the Ecotec E3000 only in a dry environment.
- ▶ Operate the Ecotec E3000 away from sources of liquid and moisture.

### CAUTION

#### **Danger due to dropping heavy loads**

The device is heavy and can damage persons and items through tilting or dropping.

- ▶ Place the device only on a sufficiently sturdy surface.

### NOTICE

#### **Property damage due to vibration**

Parts of the measurement technology rotate and must not be shaken. The parts continue to rotate for several minutes after the device is shut down.

- ▶ Place the device only on a sturdy, vibration-free surface.
- ▶ The device must not be shaken during operation and at least five minutes after being switched off.

### NOTICE

#### **Property damage due to overheated device**

The device heats up during operation and can overheat without sufficient ventilation.

- ▶ Observe the permissible operating or ambient temperature.
- ▶ Ensure adequate ventilation. There must be 20 cm of free space on the upper side of the device above the ventilation opening.
- ▶ The ventilation opening on the underside of the device must remain unobstructed.
- ▶ Keep heat sources away from the device.
- ▶ Do not expose the device to direct sunlight.

**NOTICE****Property damage due to transport protection that has not been removed**

The transport restraint blocks the mechanical system in the device.

- ▶ Remove the transport restraint before start-up.

The transport protection is on the bottom of the Ecotec E3000 and consists of a yellow star screw.



Fig. 5: Unscrew the yellow transport restraint before the start-up

## 5.2 Connecting the sniffer line

**NOTICE****Material damage due to a missing sniffer line**

The device must not be operated without a connected sniffer line in order to avoid overpressure in pump and measurement system.

- ▶ Connect the sniffer line before you start up the device.
- ▶ Do not replace the sniffer line while the device is in operation.

Align the red marking on the sniffer line plug with the red marking on the socket. Push the sniffer line plug into the socket on the device until it locks into place.

Remove the plug by pulling the grooved ring on the plug. The ring opens the lock and you can now pull the plug out.

### 5.2.1 Replacing the capillary filter of the sniffer probe

The metal capillary filter is the standard filter. With the plastic capillary filter there is less danger of scratching the surfaces to be sniffed. The water conservation tip is used if there is a danger of suctioning in liquids.

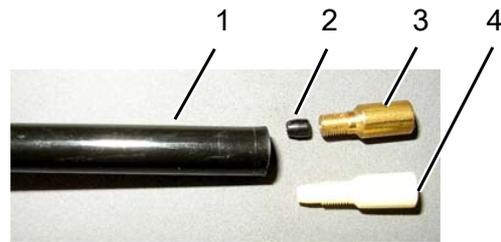


Fig. 6: Capillary filter

|   |                   |   |                          |
|---|-------------------|---|--------------------------|
| 1 | Sniffer probe end | 3 | Metal capillary filter   |
| 2 | cone seal         | 4 | Plastic capillary filter |

### 5.2.1.1 Replacing the plastic capillary filter with the metal capillary filter

- 1 Turn off the Ecotec E3000.
- 2 Unscrew the plastic capillary filter.
- 3 Insert the cone seal, see "Replacing the capillary filter of the sniffer probe [▶ 20]".
- 4 Screw in the metal capillary filter on the sniffer tip end.
- 5 Calibrate the Ecotec E3000, see "Calibrate [▶ 43]."

### 5.2.1.2 Replacing the metal capillary filter with the plastic capillary filter

If you want to switch from a capillary filter made of metal to a capillary filter made of plastic, you have to remove the cone seal. The cone seal sits on the steel capillary in the sniffer tip.

- 1 Turn off the Ecotec E3000.
- 2 Unscrew the filter.
- 3 Unscrew the two cross-head screws in the sniffer tip flange and take out the sniffer tip.
- 4 Push the capillary out of the plastic sheath a bit from the top with a narrow pin or a thin needle (about 0.5 mm). Make sure that the sinter filter in the sniffer tip flange does not get lost in doing so.
- 5 Remove the cone seal from the sniffer tip.
- 6 Put the sinter filter back in and tighten the sniffer tip on the handle.
- 7 Screw the plastic capillary filter on the sniffer tip.
- 8 Calibrate the Ecotec E3000, see "Calibrate [▶ 43]."



Fig. 7: Pushing out the capillary

### 5.2.1.3 Install and remove water protection tip

The water protection tip allows you to check test objects for leaks when they have a small amount of surface moisture e.g. condensation moisture.

#### NOTICE

##### Risk of short circuit

Sucked in liquid can destroy the device.

- ▶ Do not suck up liquids with the instrument.

The water protection tip is screwed onto the sniffer tip end like the metal capillary filter. The small cone seal must also be placed under the tip, see "Replacing the metal capillary filter with the plastic capillary filter [▶ 21]."



Fig. 8: Screw water protection tip on tight

To reinstall the plastic capillary filter, see "Replacing the metal capillary filter with the plastic capillary filter [▶ 21]."

### 5.2.2 Fasten holder for sniffer line



#### ⚠ WARNING

##### Danger to pacemaker wearers from magnets

The function of a pacemaker can be influenced by the magnet on the back of the holder.

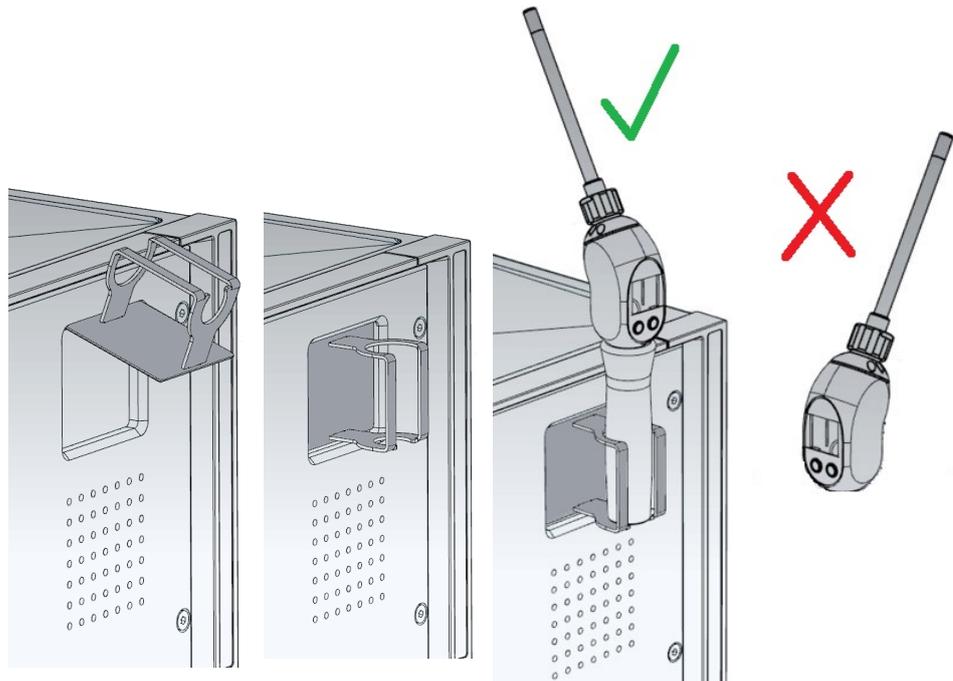
- ▶ If you wear a pacemaker, do not perform the installation yourself.
- ▶ If you wear a pacemaker, always maintain a distance of at least 10 cm from the holder when operating the device.

**⚠ CAUTION****Risk of injury due to sniffer tip**

If you fall on the sniffer tip after stumbling, for example, you may injure your eyes.

- ▶ To prevent injury from accidental contact with the sniffer tip, align the sniffer tip in the holder so that it points away from the operator.

A holder is available for the sniffer tip. The holder can be installed on the right or the left of the device.



- 1 Hang the holder with its hooks in the slots on the front of the device.
- 2 Press the holder against the front panel of the device.  
⇒ The holder is pulled to the front panel of the device with a magnet on its rear.
- 3 When not in use, fix the sniffer line in the holder so that it points away from the operator.

## 5.3 Connecting the ECO-Check calibrated leak

A built-in calibrated leak (ECO-Check) and various external calibrated leaks are available as accessories for the Ecotec E3000, see "Accessories [▶ 85]." Please refer to the ECO-Check installation manual on how to connect the ECO-Check.

## 5.4 Connecting the external display unit to the Ecotec E3000RC

Connect the external display unit and the Ecotec E3000RC with the appropriate connecting cable. Secure the plug on the socket by tightening the screws.



Fig. 9: Ecotec E3000RC with external display unit as a table device (left), for rack mounting (right)

## 5.5 Connecting IC1000/BM1000

An IC1000 and various bus modules are available as accessories for the Ecotec E3000, see "Accessories [▶ 85]."

Refer to the interface description for details on the connection.

Required settings:

- Control location: RS232 / local and RS232
- Protocol: LD
- Baud rate: 38400

## 5.6 Connecting to the power supply system

The supply voltage of the Ecotec E3000 is specified on the labeling of the mains plug (rating plate). The Ecotec E3000 cannot be switched for other supply voltages.

### **WARNING**

#### **Danger from electric shock**

Improperly grounded or fused products may be dangerous to life in case of a fault. The use of the device is not permitted without a connected protective conductor.

- ▶ Only use the 3-wire power cord provided.
- ▶ Make sure that the power supply plug is always accessible.

Connect the device to the electric power supply using the supplied power cable.

### 5.6.1 Connecting to a PC

The connection is made with a commercially available 9-pin Sub-D plug. Please refer to the “Interface description Ecotec E3000” (doc. no. kins22e1) for further information on data exchange.

### 5.6.2 Connecting with a PLC

The connection is made with a commercially available 25-pin Sub-D plug. Please refer to the “Interface description Ecotec E3000” (doc. no. kins22e1) for further information on data exchange.

## 6 Operation

### 6.1 Switching on

Connect a sniffer line and switch on the device using the mains plug.

The Ecotec E3000 starts a self-test lasting several minutes. The display shows the heading "RUN-UP" and the individual steps of the self-test.

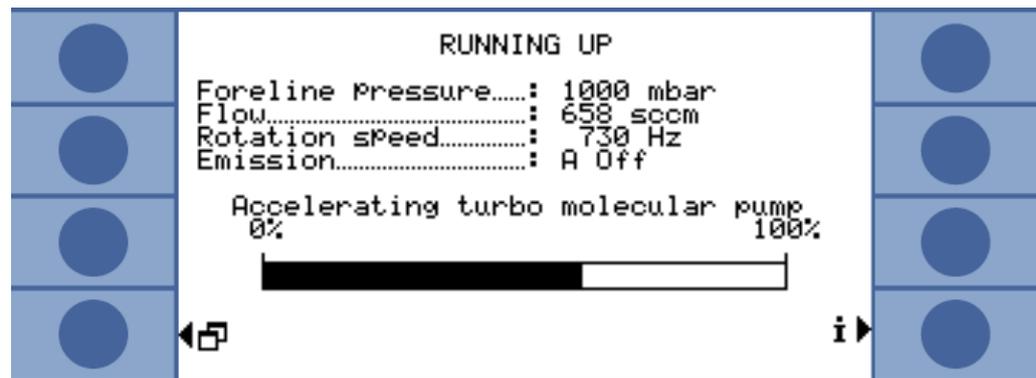


Fig. 10: The device starts up

After running up, the Ecotec E3000 already measures the gas concentration in the environment. There is no separate Start function. However, you still have to calibrate the device and make different settings for your intended measurement.

If the ECO-Check calibrated leak is not in the Ecotec E3000, an acoustic warning signal and the warning 71 are output during the first start-up.

To stop the alarm quickly, press the button on the bottom right (labeled "OK"). If you are working without the ECO-Check, you should deactivate the alarm permanently, see "Connecting the ECO-Check calibrated leak [▶ 23]."

## 6.2 Operating the device

### 6.2.1 Display and keys

All settings are made with the eight keys to the left and the right of the display. The function allocations of the keys change depending on the current operating step. The function allocation is shown directly next to the key which allows fast and purposeful operation after a short learning period.

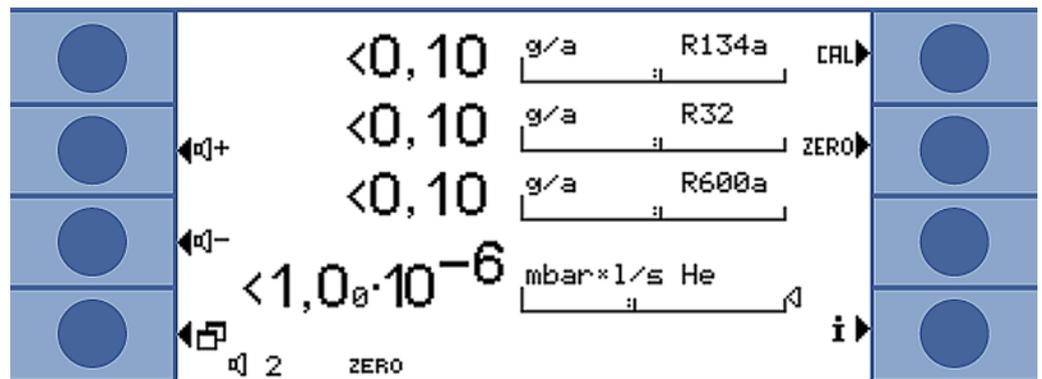


Fig. 11: Start display after the self-test

#### 6.2.1.1 Recurring function symbols

The keys are always assigned with the following functions and labeled with the shown symbols.

|             |  |
|-------------|--|
|             | Setting the volume for speakers and head phones.   |
|             | Set volume: The set volume is displayed on the bottom edge of the display.   |
|             | Value range: 0 (off) to 10 (max.).   |
|             | Calls the main menu.<br>Calls a window again that was closed with  |
| <b>CAL</b>  | Calling up calibration.  |
| <b>ZERO</b> | The lower edge of the display shows "ZERO" if a ZERO point has been set since the device start-up.   |
| <b>i</b>    | Calls up information Software version, operating hours, serial number, date and time, alarm profile.   |
|             | Back to last menu level.   |
|             | Navigates in a selection list.   |
|             | Pressing the key assigns the allocation "0" to that key and "1" to an adjacent key. The same setting option exists for the numbers "2/3", "4/5", "6/7", and "8/9". |

|   |  |
|---|--|
|  | Closing the window and calling up the measurement view.<br>Back to the window with  |
|  | Measurement with I•Guide: Bring up list of I•Guide programs.   |
|  | Calling up help for the current function.  |
| OK  | Confirm an entry or selection.   |

Table 2: Function symbols

## 6.2.2 Measurement display elements

The measured leak rates are shown numerically and with logarithmically divided bar graph displays. The other elements of the measurement view are shown in the following Figure.

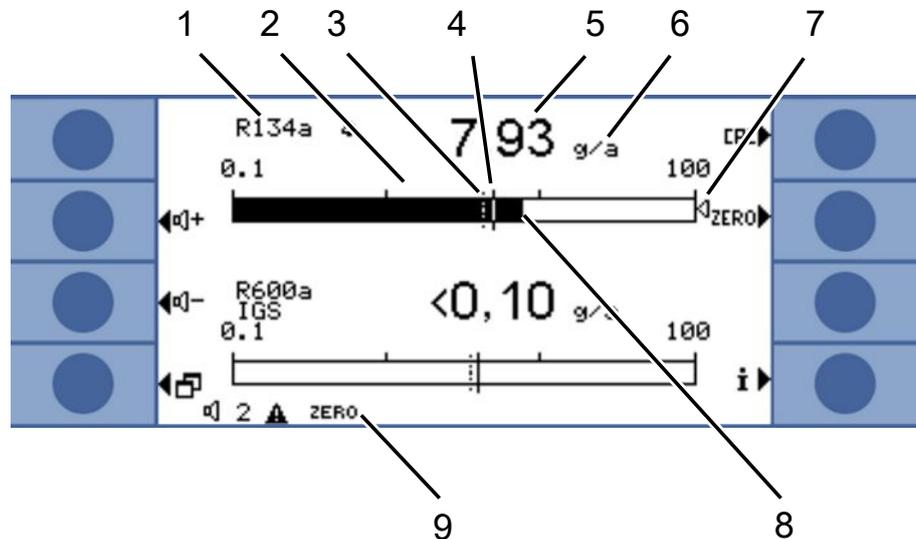


Fig. 12: Measurement display elements

|   |                                      |   |  |
|---|--------------------------------------|---|--|
| 1 | Gas                                  | 5 | Numerical leak rate display  |
| 2 | Bell: Search threshold is exceeded   | 6 | Leak rate unit   |
|   | Bell flashes: trigger value exceeded | 7 | Marker arrow: Marks the measurement displayed on the sniffer handle              |
| 3 | Search threshold (broken line)       | 8 | Bar graph, logarithmic   |
| 4 | Trigger value                        | 9 | Status bar: Symbols and text overlay provide information about the device status |

The two center buttons on the left side of the display can be used to adjust the volume of the alarm signal at any time. If one of the two buttons is pressed, the device emits a sound with the selected volume through the speaker and shows the setting with a bar graph in the status line. The set value is also the first entry in the status line on the bottom of the display and applies only to the speaker of the basic unit. To configure various alarm profiles, see "Audio settings [▶ 34]."

Menu button The button  at the lower left of the display has two functions:

- Calls the main menu.
- Back to last window that was closed with .

### Calibration button (CAL)

The button on the top right next to the display can be used to start a calibration of the Ecotec E3000 with an external test leak at any time. For further information on performing an external calibration, see "External calibration with external calibrated leak [▶ 45]."

|                           |   |
|---------------------------|---|
| <b>ZERO button</b>        | Pressing the ZERO button briefly stores the currently displayed leak rate as ZERO point for all selected refrigerants. Pressing the ZERO button for more than 2 seconds switches off the ZERO function. The display ZERO disappears from the status line in this case. For more information on the ZERO function, see "Operating elements and display on the sniffer handle [▶ 31]."  |
| <b>Information button</b> | Pressing the information button i (to the bottom right of the display) shows information on the status of the Ecotec E3000. Details: See "Calling up information on the measurement [▶ 51]."  |
| <b>Status line</b>        | <p>Status information is displayed in the lower line of the measurement window. The set volume for the alarm is displayed in the left of the line.</p> <p>If the small speaker flashes, it indicates that the device speaker is switched off. If the number flashes, this indicates that the alarm delay is switched on, see "Miscellaneous [▶ 32]."</p> <p>A small black triangle with an exclamation point next to it can indicate an active warning.</p> <p>If the ZERO function is activated, the word "ZERO" follows in the status line.</p> <p>When the first cathode (Filament A) of the mass spectrometer is used up and the Ecotec E3000 automatically switches to the second cathode (Filament B), the display "Fil. B" appears in the status bar.</p> <p>If you working with an activated IGS, "IGS" will be shown in the status line.</p> |

### 6.2.3 Operating elements and display on the sniffer handle

The display of the sniffer handle shows the most important information for the current measurement. Measurements can be controlled with the two buttons.

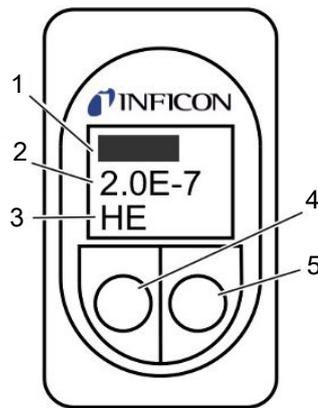


Fig. 13: Sniffer handle

|   |  |   |                                     |
|---|--|---|-------------------------------------|
| 1 | Leak rate as bar graph                                 | 4 | Left button, assigned "ZERO"        |
| 2 | Leak rate, numerical. Unit, as shown on the basic unit | 5 | Right button, different assignments |
| 3 | Measured gas   |   |                                     |

The measured leak rate is shown as an increasing or decreasing bar. The second line shows the leak rate as a numerical figure (with the same measurement unit as in the main display). The third line shows the abbreviation for the measured gas.

Depending on the measurement, the display can also show something else, e.g. "Error" or the number of a warning.

If you search for several gases simultaneously, you can switch between individual measurement results with the right button. The right button can also be used to confirm messages or states during a measurement cycle.

You can trigger the Zero function with the left button, see "Vacuum & access control [▶ 36]."

The button can be deactivated to prevent unintentional triggering: Press the button until a signal tone sounds. The button is reactivated by pressing it longer.

### 6.2.4 Special features of the Ecotec E3000RC

The Ecotec E3000RC has a connection panel for the external display unit instead of the built-in display. Two LEDs (to the left of the plug) provide information on the status of the Ecotec E3000RC, even if the external display unit is not connected.

The green LED shows that the Ecotec E3000RC is switched on. It has a steady green light if an external display is connected and flashes if no external display can be detected.

The red LED flashes in case of an error message; a steady red light indicates a warning.

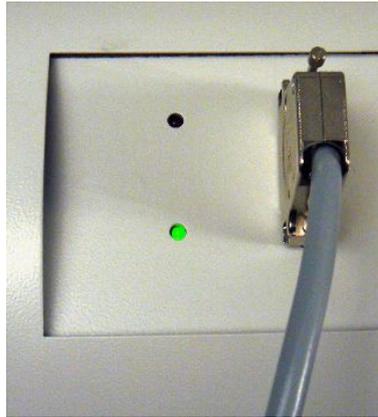


Fig. 14: Connection panel with LEDs

If no display unit is connected, you can confirm error messages and warnings by pressing both buttons on the sniffer line simultaneously.

The external display unit has four buttons:

- The menu button opens the main menu.
- The current measured background value is set as the zero point with the ZERO button, see "Vacuum & access control [▶ 36]."
- The START/STOP buttons do not have any function (the external display unit can also be used with other leak detectors made by INFICON that require these buttons.)

## 6.3 Basic settings

Before making your first measurement, set the device using the following menu:

- Miscellaneous
- Display
- Audio
- Vacuum & access control
- Interfaces (for control via interfaces and if you use an ECO-Check)

You can access the menus via the main menu

### 6.3.1 Miscellaneous

#### Language

You can select one of the following languages:

- English (factory setting)
- German
- French
- Italian
- Portuguese
- Spanish

- Japanese (Katakana)
- Chinese (Mandarin, simplified Chinese)

To set the language to English temporarily, press buttons two and six during the run-up of the Ecotec. Call up the language setting after the run-up and set the required language.

#### Date & time

- First page: Date in the DD.MM.YYYY format
- Second page (press button on the bottom right ) time with the format SS:MM.

#### Sniffer light

- Activate/deactivate light
- Adjust brightness from 1 (min) to 6 (max)

#### Pressure unit

- atm
- Torr
- Pa
- mbar

#### Leak rate filter

- Auto
- Fixed
- I-Filter

The I-Filter is an intelligent filter algorithm that delivers the best results regarding interference suppression and stability of the leak rate signal. It was especially developed for the use in the Ecotec E3000.

Only in cases in which the older Ecotec II model was replaced with an Ecotec E3000 and the Ecotec E3000 is used in a fixed test device can it be necessary to select the older filter settings "Auto" or "Fixed."

#### Alarm delay

With very unstable surface conditions, it can be expedient to emit an acoustic alarm only if the trigger value is exceeded for a specified period of time. If the function is activated, the number indicating the volume of the device speaker flashes in the status bar.

Setting range: 0 to 9.9 seconds in steps of tenths of a second Although the alarm delay is activated, the device may not warn if it finds a leak. Proceed as follows to ensure that every test is successful.

- 1 Please note the measurement display in the device and the handle.
- 2 Deactivate the function when surface conditions are stable again.

#### Wake up

If the Ecotec E3000 is in an idle state (sleep), a time can be set for it to start automatically. This way you can set the Ecotec up to run through its warm-up phase already before the shift starts.

You can set a separate wake-up time exact to the minute for each day of the week.

To deactivate the wake up again, set the wake-up time to 00:00.

## 6.3.2 Audio settings

|                             |   |
|-----------------------------|---|
| <b>Audio acknowledgment</b> | You can switch off the signals that indicate the completion of specific functions.  |
| <b>Device speaker</b>       | You can switch off the speaker installed in the basic unit. This does not influence the speaker connection.   |
| <b>Handle speaker</b>       | <p>You can choose whether the speaker in the sniffer handle should signal the exceedance of search threshold or trigger value.</p> <p>You can also switch off the speaker completely.</p> |
| <b>Alarm profile</b>        | <p>You can assign one of three alarm profiles to the device speaker:</p> <ul style="list-style-type: none"><li>• Pinpoint</li><li>• Setpoint</li><li>• Trigger/alarm</li></ul>            |

|  | Alarm profile Pinpoint  | Alarm profile Setpoint         | Alarm profile Trigger / Alarm  |
|--|---|--------------------------------|--|
| Search value exceeded                      | -   | Acoustic signal low frequency  | Acoustic signal low frequency  |
| Trigger value exceeded                     | -   | Acoustic signal high frequency | Two-tone signal  |
| Acoustic tracing of the measurement result | < 1/10 Trigger value: Low frequency                               | -                              | -  |
|  | >1/10 value of trigger to 10 x value of trigger: Rising frequency |                                |  |
|  | > 10 x value of trigger: High frequency                           |                                |  |
| Comment                                    | Recommended, for precise leak localization                        | -                              | Recommended, for precise leak localization<br>This allows identification with a signal for devices that are used together. |

Table 3: Features of the alarm profiles

### Volume

You can adjust the volume that cannot be set lower with the plus and minus buttons next to the display. This way you can prevent the acoustic signals from being switched off accidentally during the measurement.

The adjustment applies to the speaker in the basic unit and the head phones. You can also set the current volume of speaker and head phones here.

Setting range: 0 to 15

### WARNING

#### Hearing damage from excessively loud signal tones

The volume of the signal tones can exceed 85 dB(A)

- ▶ Keep away from the device when setting high volumes.
- ▶ Wear ear protection when necessary.

## 6.3.3 Display settings

In the menu “Settings > Display”, you can set the display details of the device display and the display in the sniffer handle.

### Contrast

Increase or reduce the contrast of the display using the arrow keys. If you press and hold the buttons, the values change continuously. The setting is applied immediately to the display.

- To adjust the contrast of the currently displayed menu, select “Automatic”.

- To set a dark background with light text, select “Invert display”.

If the display is no longer legible because it is too dark or too bright, you can reset the setting as follows:

1. Switch the device off and back on.
2. Press keys 3 and 7 during the run-up until the display can be recognized again.
3. Call up the window for the contrast setting and confirm the new value. The device will otherwise use the old, unrecognizable setting after the next start-up.

**Max. value**

You can set if and how long the highest measures value is to be displayed additionally below the current leak rate.

Setting range: 0 to 20 seconds.

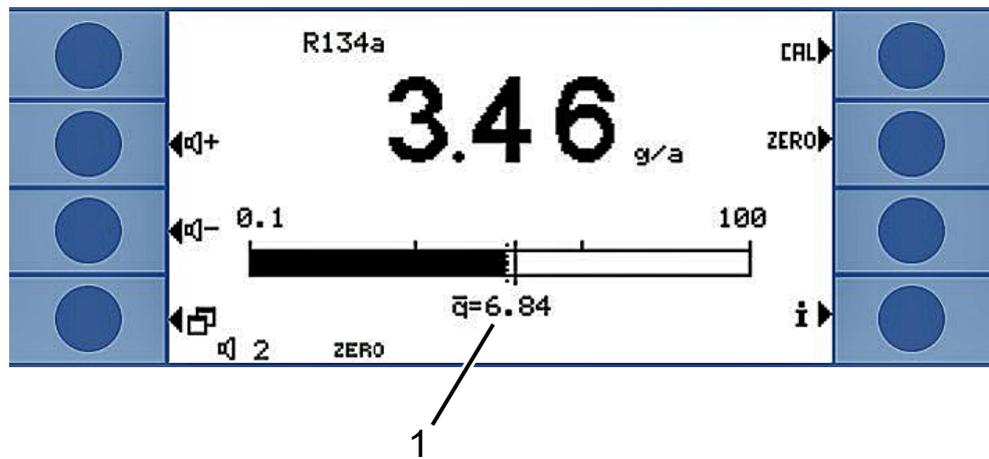


Fig. 15: Measurement view with maximum value display

|   |               |
|---|---------------|
| 1 | Maximum value |
|---|---------------|

**6.3.3.1 Gas display handle**

In the menu “Settings > Display > Gas display handle” you can define which gas is shown in the display in the sniffer handle.

**Automatic**

The display always shows the gas that the most of is measured currently. If a trigger value is exceeded, this gas will be displayed.

**Manual**

You can switch between gases with the right key on the handle.

**Auto with hold**

You can switch to another gas with the right key on the handle. After the hold time has elapsed, the display again shows the gas that the most of is measured currently.

**Hold time**

The hold time can be set to 5, 10, 15, or 20 seconds.

**6.3.4 Vacuum & access control**

**ZERO**

The gas concentration contained in the measurement environment can be set as ZERO point for measurement (background suppression). The function has the brief name “ZERO.”

If the gas concentration drips after setting the ZERO point, a negative measured value should be displayed. In order to avoid that, the ZERO point is revised downward if the measured value is negative for the duration of the “ZERO time,” see below.

The ZERO point is not automatically revised up(wards). It is therefore important to regularly reset the ZERO point.

The ZERO point can be set with the left button on the handle and with the “ZERO” button in the measurement view.

You can activate or deactivate the buttons here in this menu. Deactivation prevents the function from being triggered inadvertently and an incorrect absolute measured value from thus being displayed.

The button on the sniffer line handle can also be activated or deactivated by pressing the button longer.

**ZERO time**

ZERO time is the time during which the leak rate must be negative so that the ZERO point can be revised downward automatically. The best setting depends on your measurement conditions (sampling speed, gas background, test specimen).

Setting range: 1 to 9.9 s

**Flow limits**

To detect a leak on the 160-sccm capillary, an upper limit value is set. If the value is exceeded, the system issues the warning “Capillary broken.” With longer exceedance, device components are also switched off to protect them.

To detect a clogging of the 160-sccm capillary, a lower limit value is set. If the value is fallen short of, the system issues the “Changed flow!” warning. With a strong lower deviation, the “Flow through capillary too low” error message is issued.

The adjustment range is 160 to 999 sccm or 0 to 160 sccm.

The closer the lower limit value is set to the actual flow rate, the more sensitive the Ecotec E3000 reacts to a beginning clogging of the filter and the sniffer line.

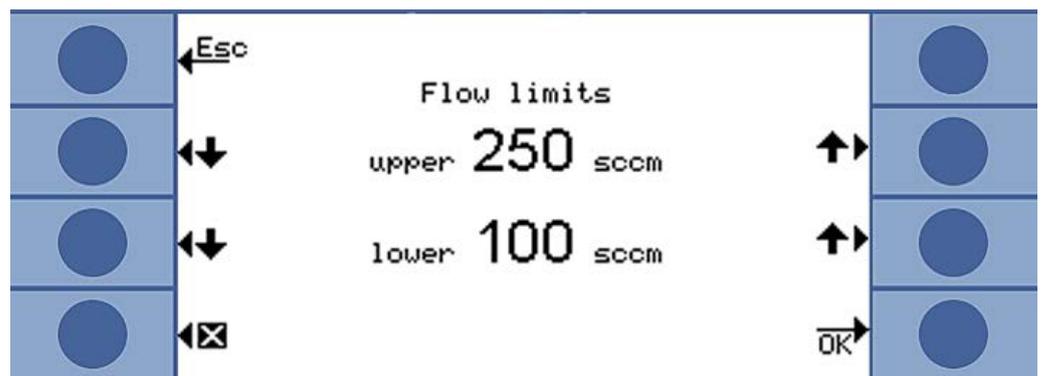


Fig. 16: Setting flow limits

The flow through the sniffer line depends on the atmospheric pressure of the environment. If you operate the device at great height, the flow rate through the sniffer line can drop considerably, approx. 20% per 1000m height. Reset the flow limits accordingly in this case.

**Sensitivity**

The sensitivity monitoring in the device ensures that the sensitivity of the Ecotec E3000 is always sufficient. The entire gas flow from sniffer tip to sensor is monitored and the software simultaneously checks whether the Ecotec E3000 can determine the

correct signal strength with it. The monitoring ensures that the Ecotec E3000 does not become insensitive and that leaks are not detected without the user noticing. If the sensitivity is reduced, the "Sensitivity too low" error message is issued. Recalibration can restore sensitivity in this case, see "Calibrate [▶ 43]." The error message is repeated every 15 seconds until calibration is started.

**monitoring**

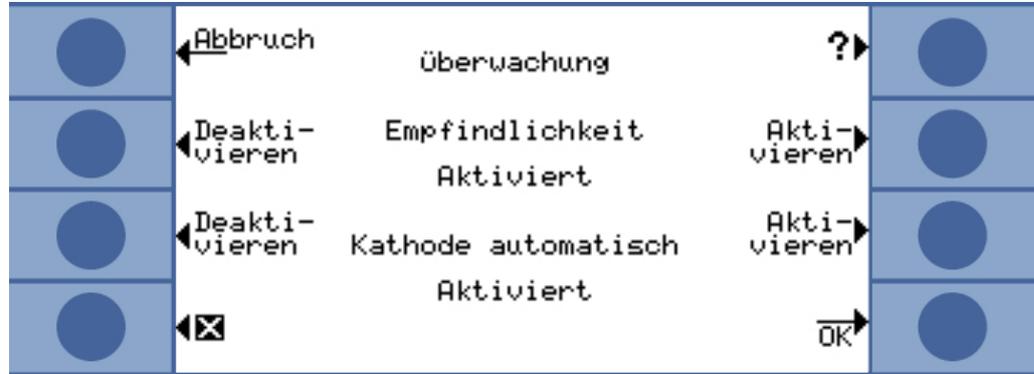


Fig. 17: monitoring

We urgently recommend leaving the monitoring switched on at all times. It should be deactivated only for measurements in an argon-free environment because monitoring requires the argon signal.

**Automatic cathode**

If the function is activated, the device switches over to the other cathode whenever the E3000 is switched on. This results in equal usage of both cathodes.

**Calibration**

In the "Calibration" window, you can activate or deactivate external calibration. This prevents a previously executed external calibration from being overwritten accidentally. For more information on calibration, see "Calibrate [▶ 43]."

**Changing the menu PIN**

You can protect access to the settings with a PIN.

To prevent entry errors, you have to enter the PIN twice. After confirmation with "OK," the main menu is displayed and the PIN is effective immediately.

To cancel protection again, enter "0000" as the new PIN (factory setting).



Fig. 18: Defining the menu PIN

### 6.3.5 Interfaces

In "Settings > Interfaces," you enter the settings for the interfaces and for the ECO-Check. Please refer to the interface description (kins22e1) for detailed information on interfaces.

|   |   |
|---|---|
| <b>Control location</b>                             | <ul style="list-style-type: none"> <li>• Local</li> <li>• RS-232</li> <li>• Local and RS-232</li> </ul> <p>Local:<br/>Only measurements values can be read out via the RS-232 interface. They are not available to control the device.</p> <p>RS-232:<br/>The Ecotec E3000 is controlled almost exclusively via the interface. The display serves only for a visual check. Some settings can be changed on the device. Please use the protection via an access PIN if all functions on the device are to be inaccessible, see "Vacuum &amp; access control [▶ 36]."</p> <p>Local and RS-232:<br/>The Ecotec E3000 can be controlled via the interface and via inputs on the device.</p> |
| <b>Recorder output &gt;<br/>Recorder scaling</b>    | <ul style="list-style-type: none"> <li>• linear</li> <li>• logarithmic</li> </ul> <p>The output is on channel 1 (pin 1 of the I/O connection).</p>  |
| <b>Recorder output &gt;<br/>Recorder gas</b>        | <ul style="list-style-type: none"> <li>• gas 1 to 4</li> <li>• auto</li> </ul>  |
| <b>Set PLC &gt; Define PLC<br/>inputs (outputs)</b> | <ul style="list-style-type: none"> <li>• You will assign different commands to the pins of the I/O connection here.</li> </ul>  |
| <b>RS-232 settings</b>                              | <ul style="list-style-type: none"> <li>• Baud rate 1200/2400/4800/9600/19200/38400</li> <li>• Blank flange LF/CR/CR + LF</li> </ul>   |
| <b>RS-232 protocol</b>                              | <ul style="list-style-type: none"> <li>• LD</li> <li>• ASCII</li> <li>• Diagnosis</li> <li>• Printer Auto</li> <li>• Printer Manual</li> </ul>  |
| <b>ECO-Check</b>                                    | <p>If you do not use a ECO-Check calibrated leak, you should choose "Deactivate" here. Otherwise, warning 71 "No communication with ECO-Check" will be issued at every start of the Ecotec E3000.</p> <p>If you use an ECO-Check calibrated leak, you can configure a warning here with respect to usage duration: 14/30/60/90 days.</p>  |

## 6.4 Settings for the measurements

With delivery, the data are programmed for the following gases and the measurement results are shown below each other in the display:

- R134a
- R32

- R600a
- He

The gas selection can be changed at any time.

### 6.4.1 Selecting the gas, changing gas parameters, activating measurement

You can access the settings via the main menu

- ▶ Select "Measuring parameters"

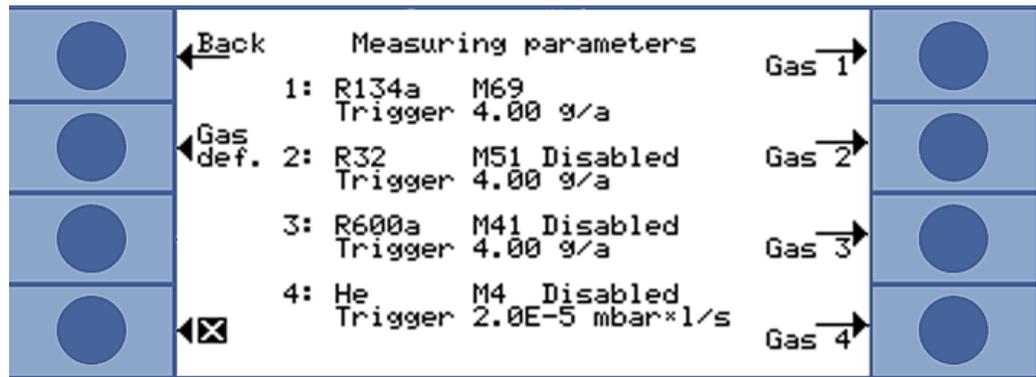


Fig. 19: Gas information for the measurement

The display shows:

- four gases
- the respective mass position
- the respective trigger value
- the "Deactivated" addition if the associated gas is currently not searched for, see below.

You can also define your own gas with the "Gas def." button, see "Setting Custom Gas [▶ 49]."

Press the button to the right of the gas whose parameters you want to change. The "Settings gas" window will open.

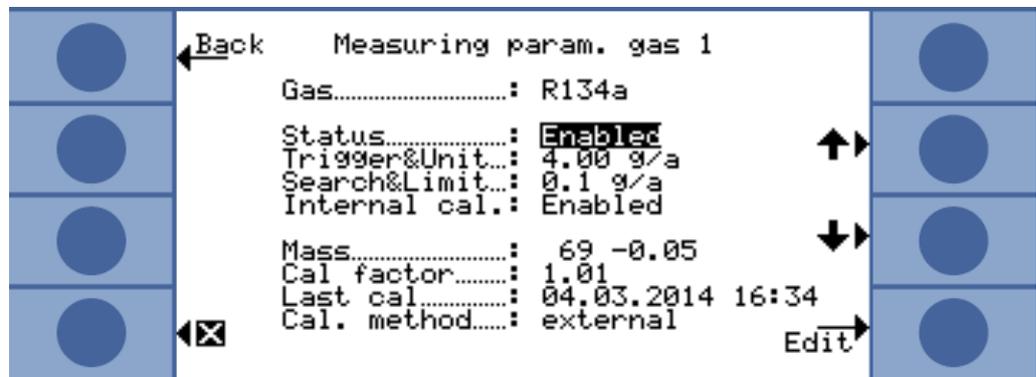


Fig. 20: Changing the settings for gas 1

With the buttons up and down you select a setting. Pressing the "change" button on the bottom right opens the associated settings menu.

**Gas**

The gas to search for is displayed. You can open the gas library with “change” and choose from approx. 100 gases there.

User-defined gases are displayed at the end of the list.

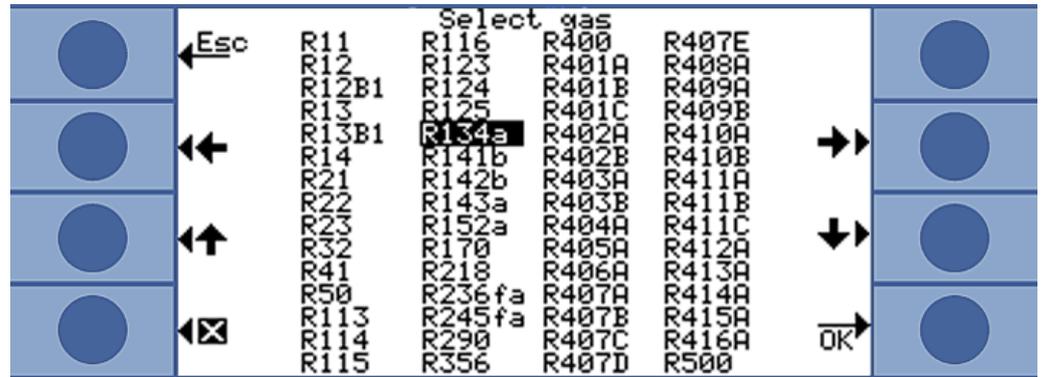


Fig. 21: Gas library

**Status**

“Status” shows whether the search for this gas is activated or deactivated. You can change the setting at any time. If the search for a gas is deactivated, it will also be displayed in the window “Measuring parameters.”

In the measurement window, the display of the measurement result for a deactivated gas is dropped and the display is clearer.

**Trigger and unit**

In the “Trigger & unit” window, you can set the trigger value with the buttons on the left and select the unit with the buttons on the right.

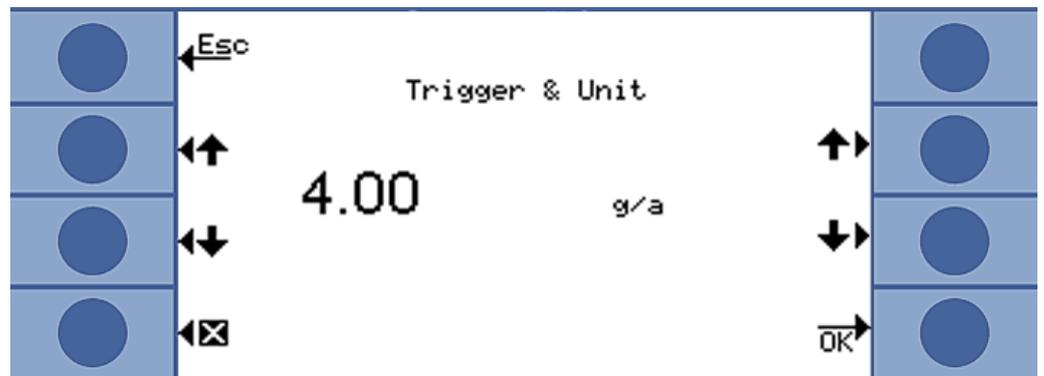


Fig. 22: Setting trigger value and unit

The following table shows the adjustable units and the associated limits for the trigger value.

| Units                | Lower trigger value limit | Upper trigger value limit |
|----------------------|---------------------------|---------------------------|
| g/a                  | 0.1                       | 1000                      |
| oz/yr                | 0.004                     | 100                       |
| ppm                  | 1                         | 999999                    |
| mbar l/s             | $2 \times 10^{-7}$        | $9.9 \times 10^{-2}$      |
| Pa m <sup>3</sup> /s | $2 \times 10^{-8}$        | $9.9 \times 10^{-3}$      |
| atm cc/s             | $2 \times 10^{-7}$        | $9.9 \times 10^{-2}$      |
| Torr l/s             | $2 \times 10^{-7}$        | $9.9 \times 10^{-2}$      |

| Units                | Lower trigger value limit | Upper trigger value limit |
|----------------------|---------------------------|---------------------------|
| sft <sup>3</sup> /yr | 2 x 10 <sup>-4</sup>      | 9.9 x 10 <sup>+1</sup>    |

Table 4: Trigger value according to unit

**Display limit (and search threshold)**

In the “Search threshold display limit” window, you can set the search threshold with the buttons on the left and select the factor for the lower display limit with the buttons on the right.

The search threshold is a percentage of the trigger value and serves as an additional warning level. Smaller leaks that are even below the trigger value can thus also be reported when needed, see "Audio settings [▶ 34]."

The absolute value of the search threshold is calculated by the device and displayed.

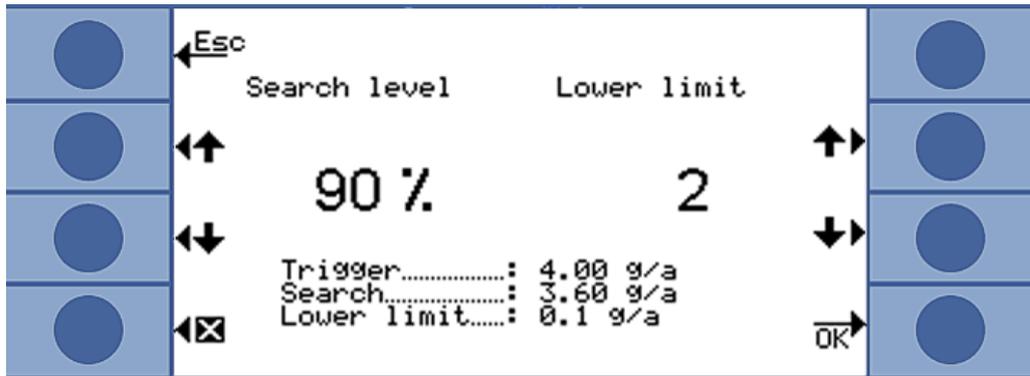


Fig. 23: Setting display limit and search threshold

With the “Display limit” function, you can hide measurement results that are below the expected leak rate. This makes the measurement view clearer especially in view of the measurement bar because smaller measurement results are hidden.

You can define the lower display limit as a multiple of the lowest measurable leak rate (1 x, 2 x, 5 x, 10 x, 20 x, 50 x, 100 x).

**Internal calibration**

You can deactivate internal calibration. If it is deactivated, only the more precise external calibration can be carried out for the gas, see "Calibrate [▶ 43]."

Internal calibration is precluded from the start if the mass position of a gas is outside the range from 40 to 105 amu.

**Mass**

With the selection of a gas from the gas library, a standard mass position is automatically selected for gas to be measured. If the device could respond to other substances in the working environment for the leak detection, we recommend selecting another mass position for the verification of the required gas. You can find a list of all possible gases with their normal and alternative mass positions in the Appendix, see "Gas library [▶ 87]."

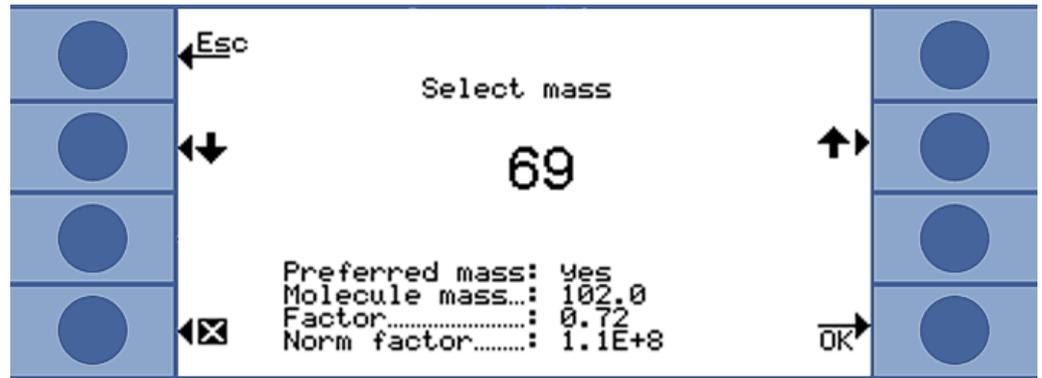


Fig. 24: Selection of another mass position

Below the selected mass is the information whether it is the preferred mass or not. The molecular mass of the gas and the height of the peak relative to the largest peak is also shown for this gas. The standard factor is a measure for the sensitivity of the device to the gas at the set mass position.

**Cal factor**

The calibration factor is displayed in this line.

**Last cal.**

Based on this line, you can check when the last calibration took place.

**Calibration method**

The line shows whether calibration was external or internal.

## 6.4.2 Calibrate

The Ecotec E3000 can be calibrated most conveniently by adding an ECO-Check calibrated leak. The ECO-Check can be integrated in the front panel of the device or set up at the testing position. It compensates temperature fluctuation and thus enables the accuracy required for calibration.

The ECO-Check calibrated leak includes R134a. It can be used for the calibration of gases with a mass position from 40 to 105 amu because the Ecotec E3000 converts the calibration result for the measurement of these gases.

You get the most accurate calibration with the external calibrated leaks. The calibrated leaks are valid for one gas each and temperature-insensitive.

**When to calibrate?**

The device should be calibrated daily and after every operator change. Calibration is also required after the following actions:

- Sniffer line replacement
- Sniffer line probe replacement
- Switch between gases (if you calibrate with an external calibrated leak)
- Filter replacement
- Prompt for calibration by the system

### 6.4.2.1 Internal calibration with ECO-Check

#### NOTICE

##### **Incorrect calibration because of operating temperature that is too low**

Calibrating the device in the cold state can deliver incorrect measurement results.

- ▶ The device must have been switched on for at least 60 minutes before calibration for hydrogen measurement.
- ▶ The device must have been switched on for at least 20 minutes before calibration for the measurement of all gases.

The ECO-Check must be installed; refer to installation manual of the ECO-Check.



Fig. 25: Built-in ECO-Check calibrated leak

If a gas measurement cannot be calibrated with the ECO-Check because the gas mass position is outside of 40 to 105 amu, the message "Int. calibration impossible" is displayed for this gas subsequent to calibration.

If a gas was blocked for internal calibration in the "Settings gas" menu, the message "Gas deactivated" is displayed, see "Selecting the gas, changing gas parameters, activating measurement [▶ 40]."

The Ecotec E3000 notices if you insert the sniffer tip in the opening of the calibrated leak and starts calibration automatically. Messages subsequently guide you through the calibration process.

A warning is displayed if the device has not been switched on for 20 minutes yet. Simply confirm the warning and then continue with calibration if you know that the device has reached operating temperature because it was switched off only briefly before calibration. Otherwise remove the sniffer tip again and start calibration later.

After measuring and a short calculation period, the results of calibration are shown in the display. The old and the new calibration factor as well as the old and the new relative peak position are displayed.

In order to prevent an earlier external and thus more accurate calibration from being accidentally overwritten, you have to press the "Confirm new values" button to complete the calibration.

1. Switch to measurement display.
2. Insert the sniffer tip in the opening of the ECO-Check until you feel some resistance.
3. Press the right button on the sniffer handle as soon as the display shows the line "Calibration: Press right button."
4. Remove the sniffer tip from the reference leak if the display shows the line "Remove sniffer from cal-opening."
5. Confirm the new values with the button on the bottom right.

### Check calibration (Test function)

If you insert the sniffer tip in the opening of the ECO-Check during measurement operation, an examination of the calibration is started automatically (test function). The device checks the measured value of the ECO-Check while the sniffer tip is inside the opening of the calibrated leak. The operator is subsequently prompted to remove the sniffer tip from the opening of the calibrated leak.

For gases released for internal calibration, either "Test o.k." or "Recalibration required!" will appear. For gases not activated for internal calibration, "Gas deactivated" will be displayed. For gases that cannot be calibrated with the ECO-Check due to very high or low mass positions, "Gas-spec. test not possible" is displayed.

Press the "OK" button or the right button on the handle to return to measurement operation.

### 6.4.2.2 External calibration with external calibrated leak

For external calibration of the Ecotec E3000, we recommend calibrated leaks with leak rates  $> 2 \text{ g/a}$ . If there are significantly elevated background concentrations in the test environment, a calibrated leak with a high leak rate is required.

External calibration is a semi-automatic process. Text messages in the display guide you through the calibration process. Calibration can be stopped at any time with the "Cancel" button.

#### NOTICE

#### **Incorrect calibration because of operating temperature that is too low**

Calibrating the device in the cold state can deliver incorrect measurement results.

- ▶ The device must have been switched on for at least 60 minutes before calibration for hydrogen measurement.
- ▶ The device must have been switched on for at least 20 minutes before calibration for the measurement of all gases.

A warning is displayed if the device has not been switched on for 20 minutes yet. Simply confirm the warning and then continue with calibration if you know that the device has reached operating temperature because it was switched off only briefly before calibration. Otherwise start calibration again later.

The gas measurement to be calibrated is generally activated. If you want to calibrate a deactivated measurement, activate the gas in the “Measuring parameters” menu.

After measuring and a short calculation period, the results of calibration are shown in the display. The old and the new calibration factor as well as the old and the new relative peak position are displayed.

1. Switch to measurement display.
2. Press the “Cal” button. The list of gases currently set for measurement is displayed (up to four gases).
3. Select the gas that the measurement is to be calibrated for.
4. Check whether the gas and the displayed leak rate match the data of the calibrated leak. If the leak rate does not match, select “Leak rate change” and correct the value.
5. Select “Start.”
6. Hold the sniffer tip into the center of calibrated leak opening and follow the instructions in the display. If you have to wait until the air signal has stabilized then this can take up to 30 seconds with a helium or hydrogen calibration.
7. Confirm the new values with the button on the bottom right.

### 6.4.3 Gas equivalent to helium and hydrogen, settings for diluted gas

If you are looking for helium or hydrogen, you can have also have the determined leak rate for the gas equivalent displayed, e.g.as R134a.

If you have an equivalent set, all displays will show the original gas followed by the equivalent in brackets. For example: He (R134a)

Proceed as follows to set a gas equivalent:

1. Select helium or hydrogen from the gas library.
2. Select the “Status” line in the “Settings gas ...” window and press “Change.”
3. Select “Equivalent name” in the window that opens. The gas library will be displayed again.
4. Select the equivalent name and confirm with “OK.”

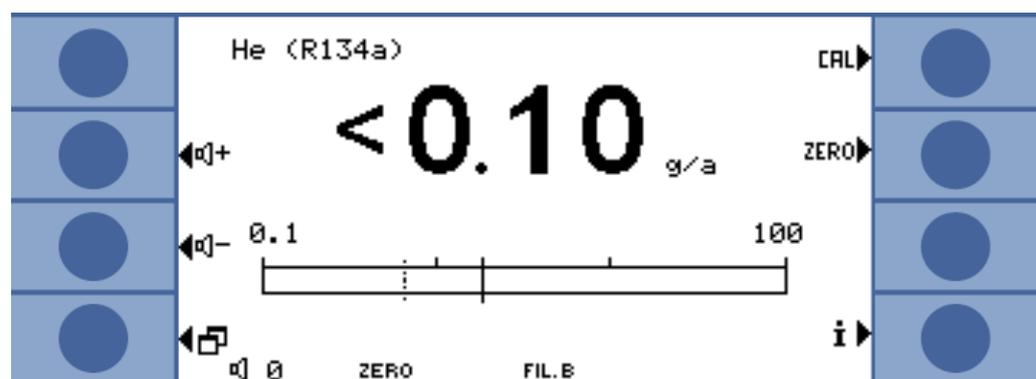


Fig. 26: Example for a measurement view with helium as refrigerant equivalent

You can also take a different pressure and/or different concentration between original gas and gas equivalent into consideration.

An internal conversion of the measurement result thus allows the Ecotec E3000 to approximate the result of a leak pre-check close to the result of a main leak examination.

Enter the settings for concentration and pressure in the “Settings gas...> Status > Change > Equivalent settings” window.

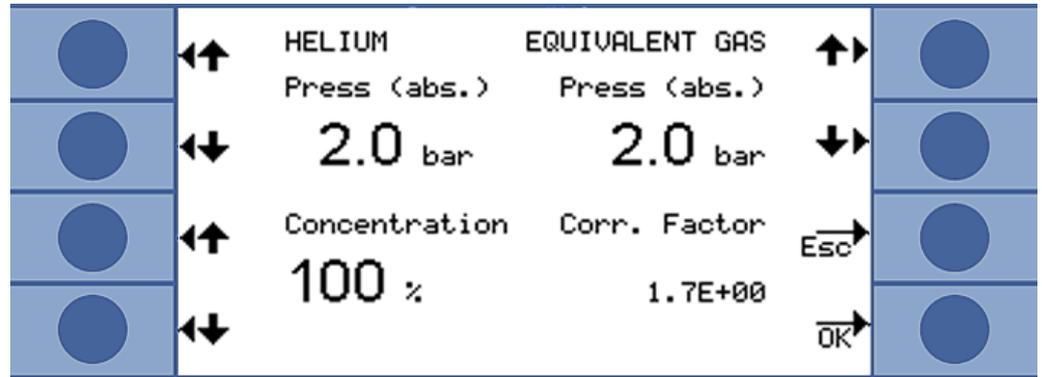


Fig. 27: Setting the parameters for gas equivalent and diluted gas

In this window, you can enter the helium or hydrogen filling pressure. You can enter the pressure for the equivalent gas next to that.

The bottom right shows the correction factor of helium/Hydrogen based on the gas equivalent. If a set of parameters that exceeds the limits of the Ecotec E3000 is entered, the correction factor is displayed with inverted colors. In this case, adjust the parameter until the correction factor display returns to normal.

On the bottom left, you can enter the value for the gas concentration. If you are looking for diluted helium or hydrogen, you can take the dilution into consideration in this setting. The leak rate for the undiluted gas is then displayed as the measured value.

Select “OK” when all parameters are set correctly.

Please note: If you are working with diluted gas, you have to select the original gas as gas equivalent, i.e. gas and gas equivalent are identical.

**Switching off the gas equivalent function**

To switch off the gas equivalent setting, select the last entry from the gas library (Settings gas ...> Status > Change > Equivalent name).

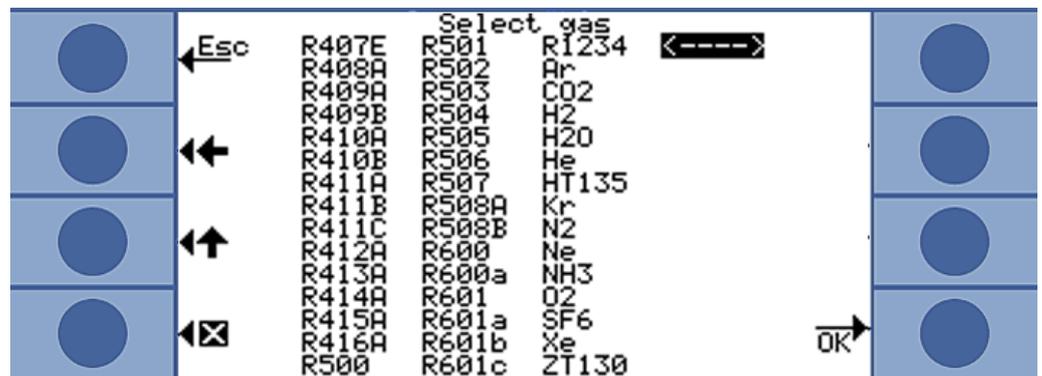


Fig. 28: The last entry switches off the gas equivalent function

### 6.4.4 Suppress interfering gases

IGS causes the findings of the interfering gases cyclopentane, isopentane as well as any mixture thereof to be suppressed during the search for refrigerant R600a. Up to an interfering gas concentration of 50g/a, the error is only 1% at most.

If IGS is activated, only one additional gas can be entered in the list of sample gases. If more than two gases are activated for R600a when IGS is activated, the additional gases (starting with the highest gas number from 1 to 4) will automatically be deactivated so that there are only two gases left.

If R600a is measured with IGS and R134a is set as second gas, select mass position 83 for R134a because malfunctions between propellant and R134a will occur otherwise.

IGS requires little maintenance. If repeated false alarms occur during the sniffing with IGS, calibration must be set to interfering gases, see below.

#### Activate IGS

1. Select R600a as the gas to be searched for: "Measuring parameters > Gas ... > Gas > Change > R600a > OK."
2. Switch to mass setting in the "Measuring parameters gas ..." window.
3. Browse the available mass positions until "IGS" is displayed in the line for the preferred mass.
4. Confirm with "OK."

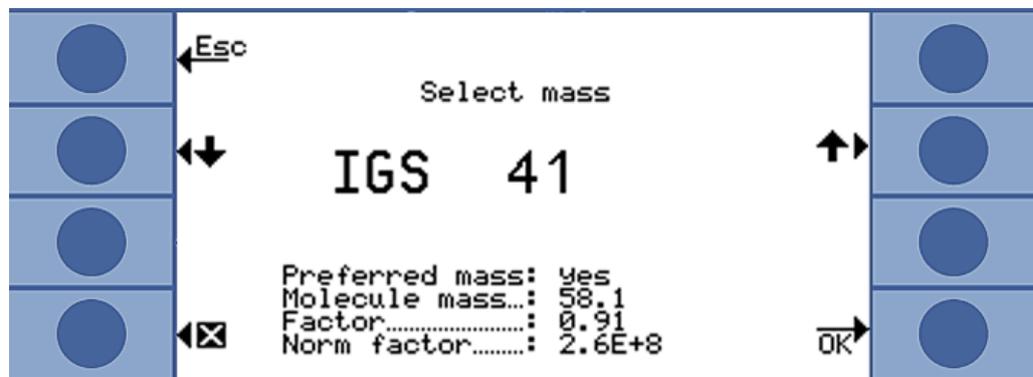


Fig. 29: Selection of the IGS mode for R600a

#### IGS alignment

The previous, actual calibration is carried out with and external test leak as it is with other gases. For the additional IGS calibration, you need a cyclopentane test leak and an isopentane test leak, available as "Calibration set for IGS mode."

The Ecotec E3000 recognizes errors you make in the gas sequence during the alignment and notifies you with a flashing gas display.

1. Activate IGS, see above.
2. Select "Cal" in the measurement window.
3. Select the gas R600a in the "Select gas" window. The entry should be expanded with IGS.
4. Select "IGS alignment" in the "Start external calibration" window and follow the instructions on the display.

5. Confirm the calibration with "OK."

## 6.4.5 Setting Custom Gas

You can save the settings for six individual gases.

- In the main menu, select "Measuring parameters > Gas def.," then an entry and "Change."

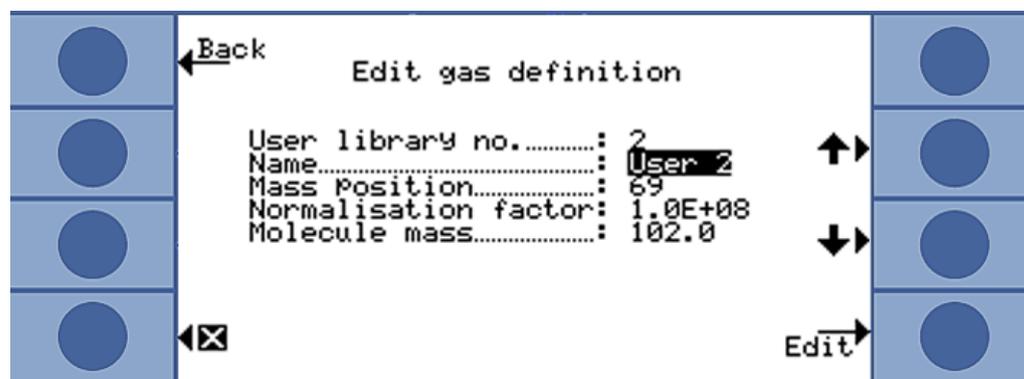


Fig. 30: Settings for a user-defined gas

You can switch between settings with the arrow buttons and open a settings window by pressing the "change" button.

### User library no.

Shows the number of the gas definition to be edited currently.

### Name

You have to enter a name for the gas to be defined.

The buttons are assigned with letters and you can assign names with six characters with them. Once you have entered the sixth character, you can leave the window by selecting "OK."

### Measuring mass

The mass determines the position of the peak at which the user-defined gas is measured. The Ecotec E3000 can detect masses from 2 to 200 amu.

The buttons are with assigned with numbers and you can enter masses between 2 and 200.

### Standard factor

The standard factor is used to convert the current supplied by the sensor into a leak rate signal. If you are setting a user-defined gas, the Ecotec E3000 should subsequently be calibrated with an external test leak, if possible. If calibration is successful, you will not modify the standard factor. If calibration fails and the error message "Calibration factor too high" is displayed, the standard factor must be reduced by decade, e.g. from 1.0E+08 to 1.0E+07. If the "Calibration factor too small" error message appears, increase the standard factor by a decade, e.g. from 1.0E+08 to 1.0E+09. Repeat this process until the Ecotec E3000 has been calibrated successfully.

### Molecular mass

Enter the molecular mass of the gas to be measured with the arrow buttons (usually included in the data sheet for the gas).

## 6.4.6 Measure

### WARNING

#### Risk of electric shock

Electrical voltages can be transmitted via the sniffer tip and can cause property damage or personal injury.

- ▶ Do not touch live parts with the sniffer probe.
- ▶ Disconnect electrically operated test objects from the mains before starting the leak test and secure them against a restart without authorization.

### WARNING

#### Risk of eye damage

LEDs generate a bundled light that can damage your eyes.

- ▶ Do not look into the LEDs from a short distance or for longer periods of time.

### CAUTION

#### Risk of electric shock

Sucked up liquids can trigger short circuits and cause property damage or personal injury.

- ▶ Do not suck up liquids into the device.
- ▶ Use the water protection tip in humid environments.

### NOTICE

#### Material damage due to a missing sniffer line

The device must not be operated without a connected sniffer line in order to avoid overpressure in pump and measurement system.

- ▶ Connect the sniffer line before you start up the device.
- ▶ Do not replace the sniffer line while the device is in operation.

#### Requirements

A measurement requires:

A sniffer line is connected to the basic unit.

The device has started up and is warmed up, see "Switching on [▶ 26]."

The device is calibrated, see "Calibrate [▶ 43]."

You have configured the device settings required for measurement, see "Basic settings [▶ 32]."

You have configured the measurement settings required for your measurement, see "Settings for the measurements [▶ 39]."

**Measuring position and speed**

Hold the sniffer tip to the potential leak as close as possible. The tip may even touch the test object. If you want to test a weld seam or similar, you must guide the tip along the path at a speed of less than 10 cm/s. Please also note the minimum measurement time for the search for helium, see "Special features of individual gases [▶ 61]."

**Measuring sequence**

- 1 Keep the sniffer tip away from possible gas sources and press the left button on the sniffer handle (ZERO).
- 2 Perform sniffing of the test object.

If there is a leak, it will be reported in the displays with flashing LEDs in the sniffer handle and - depending on your settings - also accompanied by an acoustic signal.

Because of the high measuring sensitivity of the device and because interfering gases can falsify the measurement result, you should repeat the measurement if a leak has been reported. Remember to suppress the background again beforehand (press the left button on the sniffer handle).

**Measurement in unstable subsurface conditions**

In case of very unstable background conditions, it may be best to issue an alarm only if the trigger value is exceeded for a specified period of time, see "Miscellaneous [▶ 32]."

6.4.6.1 Calling up information on the measurement

Press the i-key to obtain information on the current measurement:

- Software version
- Operating hours
- Serial number
- Date and time
- Alarm profile
- Selected gases with mass position and trigger value. Gases that are set but that are not currently sought for are marked.

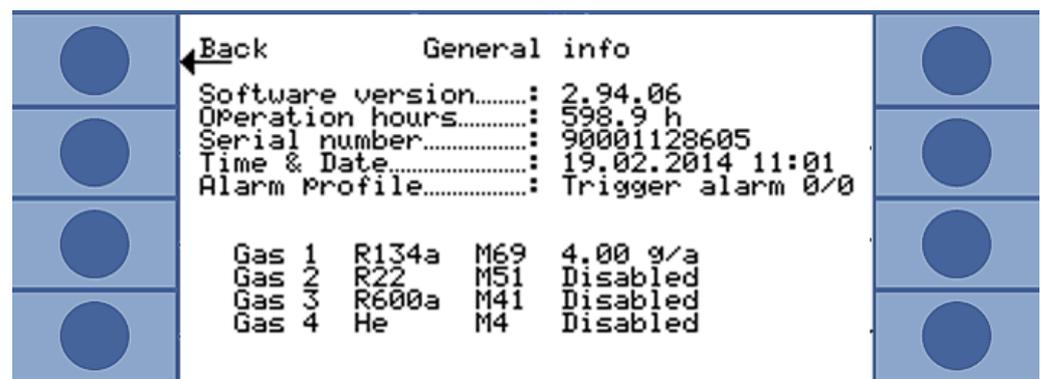
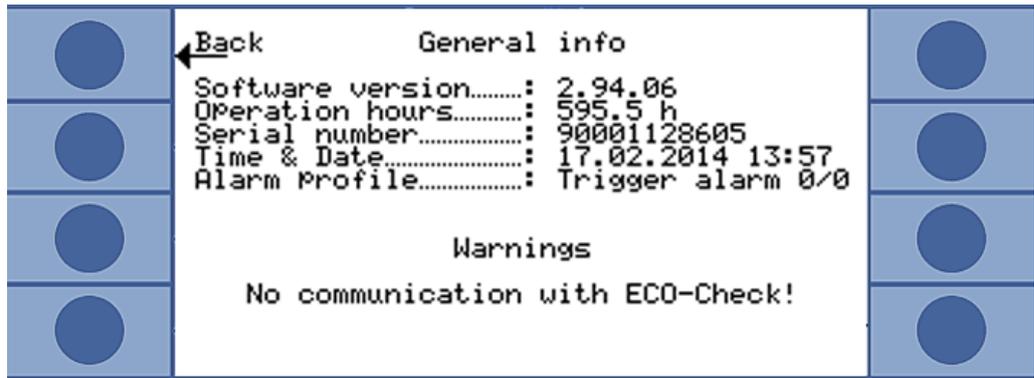


Fig. 31: Information on the measurement

If there is an error message or a warning then this will be displayed instead of the gases.



### 6.4.7 Measuring with I•Guide

I•Guide was developed to support the operator in the application of the correct technique for leak detection.

With an I•Guide program, a time sequence and a repetition rate are predefined for sniffing for one or two gases. The following details can be set:

- one or two gases
- trigger values for the gases
- Number of measuring points
- measurement time per measuring point
- idle time between measurements (transition to next measuring point)
- maximum permissible overall leak rate for the part to be tested

The right key on the sniffer handle must be pressed in order to confirm the measurement at an individual measuring point. Confirmation can alternatively take place via the interface programming.

You can set ten I•Guide programs.

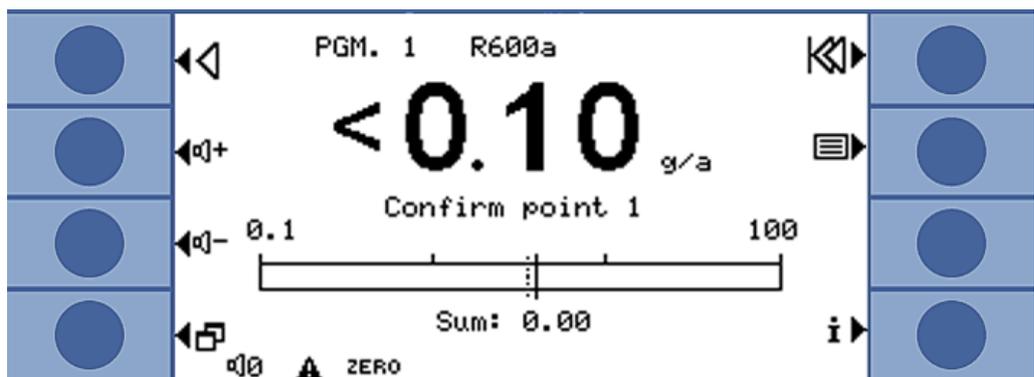


Fig. 32: Measurement view in an I•Guide program

#### I•Guide as a timer signal

You can also do without the calculation of an overall leak rate. The I•Guide program then serves merely as a default for time-controlled measuring. Set the number of measuring points to ZERO for this.

### Capturing the results of a long measurement series with I•Guide

You can combine the leak rates of a maximum of 99 measurements with I•Guide. Set the number of measuring points to 99. If you then press the right-hand button on the sniffer handle for two seconds during the measurement, a results window with the individual measurements and the total leak rate is displayed. After the 98th measuring point, the result is displayed automatically.

#### 6.4.7.1 Setting the I•Guide program

1. Select "Main menu > Settings > I•Guide setting."
2. To activate I•Guide select "Activate."
3. To enable confirmation with the right button on the sniffer handle, select "Key on." Control is otherwise possible only via interface.
4. Select one of the 10 programs with the arrow buttons and then press "change."
5. Select the setting you want to change with the arrow buttons and press "change."
6. Adjust the settings as described below and confirm with "OK."

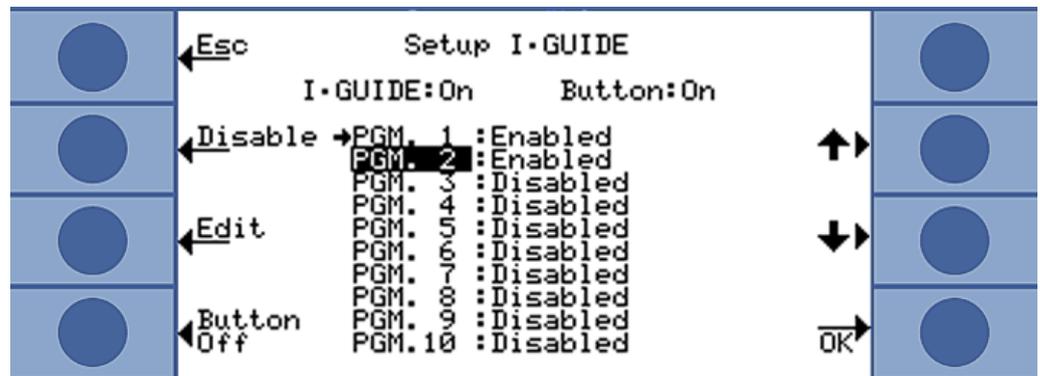


Fig. 33: List of I•Guide programs

|   |  |
|---|--|
| <b>Name</b>                                 | Name of the program. A name comprises six characters. After you have entered the last character, you can confirm with "OK."  |
| <b>Gas A</b>                                | One of the four gases that was selected for the search can be selected, see "Selecting the gas, changing gas parameters, activating measurement [► 40]."   |
| <b>Gas B</b>                                | See above. If no second gas is to be searched for, set this to "0."  |
| <b>Trigger value A/<br/>trigger value B</b> | The maximum permissible leak rate for the addition of all measurements of an I•Guide program can be set here. The trigger value for a single measurement complies with the trigger value originally set for a gas. |
| <b>Number of measuring<br/>points</b>       | 0 to 99.   |
| <b>Measuring time</b>                       | 1 to 25 seconds. You must not set the measurement time to be shorter than the response time of the device, see "Technical data [► 16]."  |
| <b>Idle time</b>                            | You can set a time between 0.1 and 25 seconds for the transition to the next measuring point.  |

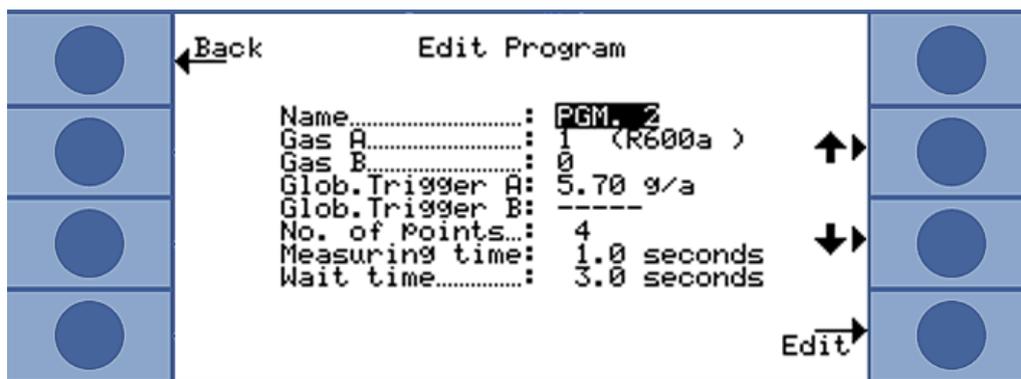


Fig. 34: Settings for an I•Guide program

### 6.4.7.2 Starting the I•Guide program

Messages in the display of the basic unit, messages in the display of the handle and acoustic signals guide you through the program.

1. If due, calibrate the device externally. During the work with I•Guide, the device can be calibrated internally only.
2. Activate I•Guide in the I•Guide menu, see above. A message shows the gas that is being searched for. It is the gas from the first activated I•Guide program. Confirm with "OK."
3. Switch to the main menu. Measurement will start immediately.
4. Follow the messages.

| Process                                  | Message in main device display | Message in handle display   | Acoustic basic unit | Acoustic signal handle |
|--|--------------------------------|---|---------------------|------------------------|
| Idle time to move to the measuring point | Tip to point ....              | To pos. ....  | -                   | -                      |
| Prompt to confirm the position.          | Confirm point ....             | OK? Pos. .... Confirm with the right button if the sniffer tip is at the measuring point. | -                   | -                      |
| Measure                                  | Measure point ....             | Measure pos. ....   | Ticking             | -                      |
| Measurement time elapsed                 | Tip to point ....              | To pos. ....  | Short signal        | Short signal           |

| Process         | Message in main device display  | Message in handle display   | Acoustic basic unit | Acoustic signal handle                             |
|-----------------|---|---|---------------------|--|
| Cycle completed | Cycle number of measurement<br>Measured gas<br>Single leak rates and sum of measured leak rates<br>"OK!" with a total leak rate below the limit value<br>"Leak in the cycle!" with a total leak rate above the limit value or if the trigger value was exceeded in a single measurement.<br>If you are searching for two gases: You can change between the displays for the two gases with the buttons "A" and "B." | Measured gas<br>Sum of measured leak rates<br>"OK!" with a total leak rate below the limit value<br>"Error!" with a total leak rate above the limit value or if the trigger value was exceeded in a single measurement.<br>If you are searching for two gases: The display automatically switches between the displays for the two gases. | Long signal         | Long signal<br>Constant signal in case of an error |

Table 5: User prompts I•Guide program

"Please wait" or "Wait" is displayed if you want to start the next measurement by pressing the button before the idle time has elapsed.

During a cycle, you can use the key ◀ to move back one measuring point.

The key ⏪ takes you back to the beginning of the cycle.

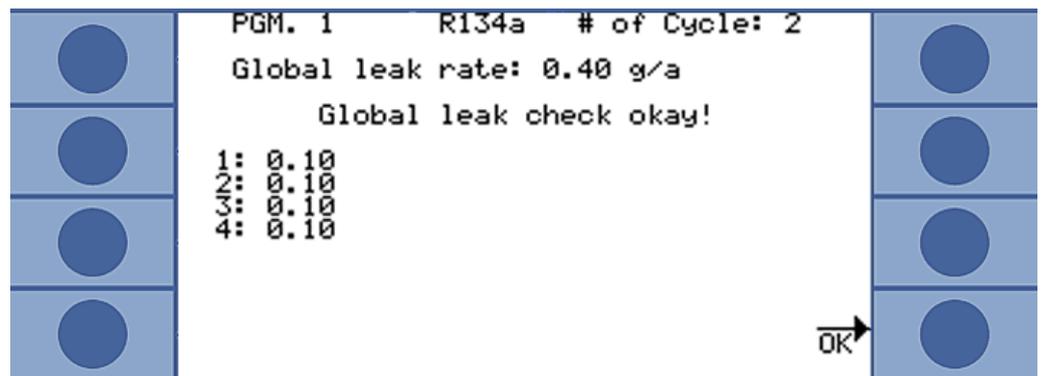


Fig. 35: Display after a successful measurement

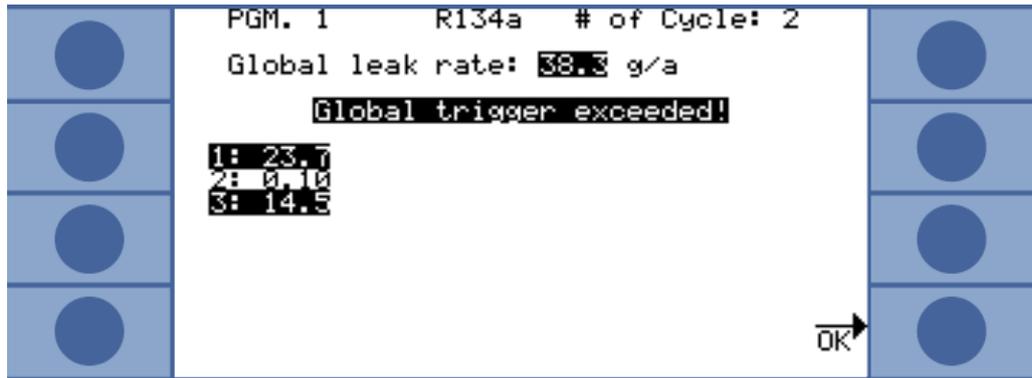


Fig. 36: Search with I•Guide-Program 1 for gas R134a: The trigger value and the total leakage rate were exceeded at measuring points 1 and 3.

The next measurement cycle starts if you confirm with “OK” or the press the right button on the sniffer handle.

**Changing the I•Guide program**

The new I•Guide program must be set and activated in the I•Guide settings, see above.

- ▶ Open the list of I•Guide programs in the main menu with and select one. Measurement will start immediately.

**Resetting the I•Guide cycle counter**

In the “I•Guide setting” window, you can reset the I•Guide cycle counter manually with the button “Reset counter.”

The cycle counter is always set to ZERO when the device is switched off.

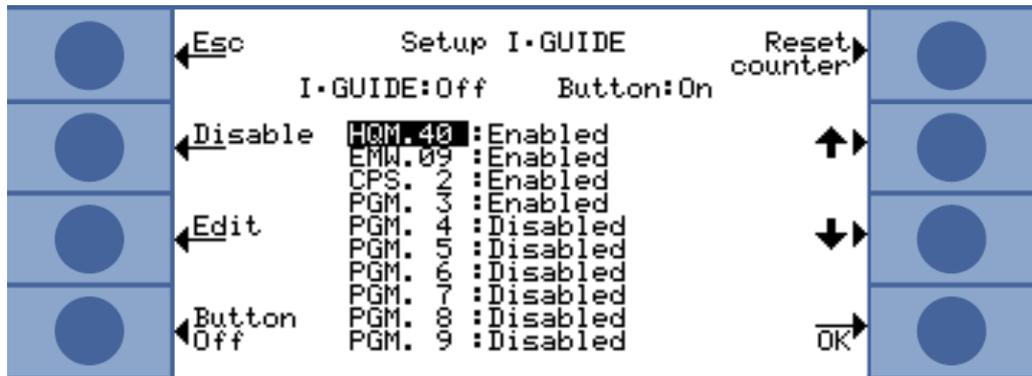


Fig. 37: Cycle counter reset

**Calling up information on the I•Guide program**

Press the **i** key to obtain information on the current measurement:

- Software version
- Operating hours
- Serial number
- Date and time
- Alarm profile
- Information on the current I•Guide program

If two gases were selected for the I•Guide program, gas type A/B and leak rate sums A/B are displayed alternately.

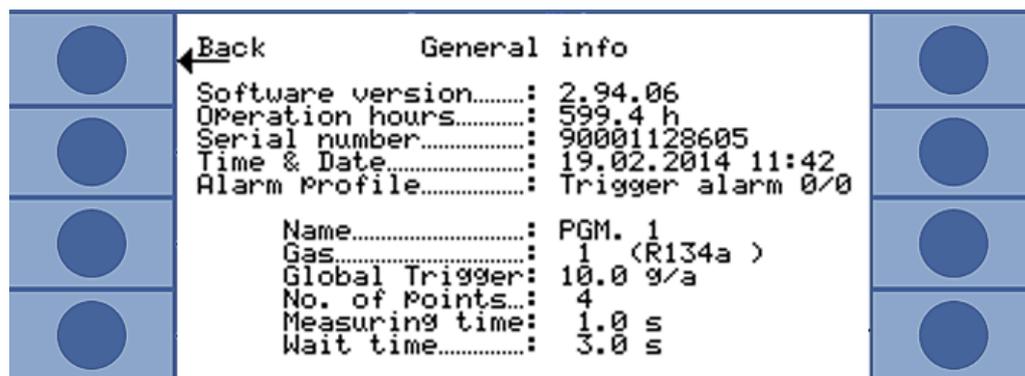


Fig. 38: I•Guide information page

If there is an error message or a warning then this will be displayed instead of the I•Guide program information.

## 6.5 Idle state (sleep)

The idle state is a meaningful alternative to switching the device off only if you allow the device to run up automatically with the wake-up function, see "Miscellaneous [▶ 32]."

If you press the SLEEP button in the main menu of the device, the device goes into idle state. The mass spectrometer is switched off and the pumps are stopped.

"Sleep" is replaced with "START" in the main menu and the Ecotec E3000 is run up again with "START" or the wake-up function.

The electrical components cannot maintain operating temperature in idle mode. After a restart, precise measurements are therefore possible only after the warm-up time, see "Calibrate [▶ 43]."

## 6.6 SERVICE

The service menu is password-protected. Settings in the service menu can be made only after a special INFICON service training.

## 6.7 Retrieve information about the device

You can call up all information about the device by selecting "Info" from the main menu. The information is spread out over nine pages. The button on the bottom right switches you to the next page and the button on the bottom left takes you back one page. The page number is displayed in the upper right hand corner.

| Menu item                          | Format | Description                   |
|------------------------------------|--------|-------------------------------|
| <b>Page 1: General information</b> |        |                               |
| Foreline pressure                  | mbar   |                               |
| Flow                               | sccm   | Flow through the sniffer line |

| Menu item                                   | Format            | Description  |
|---|-------------------|--|
| Total pressure                              | mbar              | Pressure in the mass spectrometer                  |
| Time since power on                         | Min               |  |
| Operating hours                             | h                 |  |
| Serial number                               | 9000 XXX XXXX     |  |
| Software version                            | x.xx.xx           |  |
| Electronic system temp.                     | °C / °F           | Temperature of CPU board                           |
| TSP temperature                             | °C / °F           | Temperature of mass spectrometer                   |
| Calibrated leak temperature                 | °C / °F           | Temperature of ECO-Check                           |
| <b>Page 2: Data of turbo molecular pump</b> |                   |  |
| Status                                      | On / Off / Run-up |  |
| Current Error code                          |                   |  |
| Rotation speed                              | Hz                |  |
| Current                                     | A                 |  |
| Voltage                                     | V                 |  |
| Driving power                               | W                 |  |
| Operating hours of the TMP                  | h                 | Operating hours of the turbo molecular pump        |
| Operating hours TC                          | h                 | Operating hours of the frequency converter for TMP |
| Run-up time                                 | s                 |  |
| Software version                            | xxxxxx            |  |
| <b>Page 3: Date of transpector</b>          |                   |  |
| Configuration                               |                   |  |
| Box version                                 | x.xx              |  |
| Control SW version                          | x.xx              |  |
| Measure SW version                          | x.xx              |  |
| Filament                                    | A or B/A or B     | Set cathode / active cathode                       |
| Power on time                               | h                 |  |
| Emission on time A                          | h                 |  |
| Emission on time B                          | h                 |  |
| Serial number box                           |                   |  |
| Serial number sensor                        |                   |  |

| Menu item                                    | Format                                | Description   |
|--|---------------------------------------|---|
| <b>Page 4: Data of ECO-Check</b>             |                                       |   |
| Gas  | Rxxx                                  | Gas of internal leak  |
| Leak rate nom. / at T<br>nominal leak rate / | x.x g/a / x.x g/a                     | Leak rate at current<br>temperature                               |
| Version/Checks.                              | x.x / hexadecimal code                | Software version with<br>checksum                                 |
| Serial no.                                   | 9000 XXX XXXX                         |   |
| Serial no. reservoir                         | 9000 XXX XXXX                         |   |
| Filling date                                 | DD.MM.YYYY                            |   |
| Expiry date                                  | DD.MM.YYYY                            |   |
| Gain/Offset                                  |                                       | Parameters for the<br>temperature measurement<br>in the ECO-Check |
| Test leak temperature                        | °C / °F                               |   |
| Status of light barrier                      |                                       |   |
| <b>Page 5: Data of sniffer line</b>          |                                       |   |
| Type   | SL3000/System                         |   |
| Software version                             | x.x                                   |   |
| Length                                       | 3 m / 5 m / 10 m / 15 m               |   |
| Serial no.                                   | 9000 XXX XXXX                         |   |
| Button left                                  |                                       |   |
| Button right                                 |                                       |   |
| Background light                             | Green/red                             | Background light  |
| Bar graph                                    |                                       |   |
| Flow (calibration)                           | sccm                                  |   |
| Movement                                     |                                       |   |
| <b>Page 6: I/O port data</b>                 |                                       |   |
| Recorder A                                   | V                                     |   |
| Recorder B                                   | V                                     |   |
| Sleep  | Low / High                            |   |
| ZERO   | Low / High                            |   |
| Gas a/b/select                               | Low / Low / Low High /<br>High / High |   |
| Input reserved                               | Low / High                            |   |
| Leak/Ready/Error                             | Low / Low / Low High /<br>High / High |   |
| Relay "Leak"                                 | Low / High                            |   |

| Menu item   | Format       | Description                                   |
|---|--------------|---|
| Relay "Ready"   | Low / High   |   |
| Output reserved   | Low / High   |   |
| <b>Page 7: Analog data</b>  |              |   |
| AIN3 sniffer length   | V            |   |
| AIN4 +5V II leak  | V            |   |
| AIN5 +24V III ext.  | V            |   |
| AIN6 +5V I sniffer  | V            |   |
| AIN8 -15V MC50  | V            |   |
| AIN9 +15V MC50  | V            |   |
| AIN10 +24V MC50   | V            |   |
| AIN11 +24V I TSP  | V            |   |
| AIN12 +24V II TMP   | V            |   |
| <b>Page 8: Analog data</b>  |              |   |
| AIN0  | V            |   |
| AIN0 offset   | V            | AIN0 offset                                   |
| Foreline pressure   | mbar         | Foreline pressure                             |
| AIN1  | V            | AIN1  |
| Flow  | sccm         | Flow  |
| <b>Page 9: RS-232 Info</b>  |              |   |
| Ecotec E3000 ® Sniffer  | ASCII string | Command sent from main device to sniffer line |
| Sniffer ® Ecotec E3000  | ASCII string | Command sent from sniffer line to main device |
| The information in the first two lines can be switched with the buttons "Sniffer" and "Leak": |              |   |
| Ecotec E3000 ® Leak   | ASCII string | Command sent from main device to test leak    |
| Leak ® Ecotec E3000   | ASCII string | Command sent from test leak to main device    |
| Host ® Ecotec E3000   | ASCII string | Command sent from mainframe to Ecotec E3000   |
| Ecotec E3000 ® Host   | ASCII string | Command sent from Ecotec E3000 to mainframe   |
| <b>Page 10: Info field bus</b>  |              |   |
| IC1000  | 24 V supply  |   |
|   | SW version   |   |

| Menu item                              | Format               | Description |
|--|----------------------|-------------|
|  | SW version BL        |             |
|  | Serial number        |             |
| BM1000                                 | Bus type             |             |
|  | SW version Module    |             |
|  | Serial number Module |             |
|  | Address act. Value   |             |
| <b>Page 11: Info field bus BM 1000</b> |                      |             |
|  | Baud rate            |             |
|  | Exception code       |             |
|  | Error counters       |             |
|  | State                |             |
|  | Station name         |             |
|  | IP address           |             |
|  | IP subnet mask       |             |
|  | Gateway IP address   |             |
|  | DHCP enabled         |             |

Table 6: Device information

## 6.8 Special features of individual gases

### R134a: Influencing by cyclopentane and R245fa

If you are sniffing for R134a, the presence of cyclopentane and R245fa can lead to incorrect measurement results. Search for R134a with alternative mass position 83, if cyclopentane and R245fa could be sniffed. Setting a different mass, see "Setting Custom Gas [▶ 49]."

### R600a: Influencing by cyclopentane and isopentane

If you are sniffing for R600a, the presence of cyclopentane and isopentane can lead to incorrect measurement results. Search for R600a with the IGS mass position, if cyclopentane and isopentane could be sniffed. Setting the IGS mass position, see "Suppress interfering gases [▶ 48]."

### Special features with helium

If you are sniffing for helium, the Ecotec E3000 needs longer for an analysis than with refrigerants. Therefore stick to the following times during which you will not move the sniffer tip.

| Length of sniffer line | Minimum measurement time |
|------------------------|--------------------------|
| 3 m                    | 2.2 s                    |
| 5 m                    | 2.5 s                    |
| 10 m                   | 3.3 s                    |
| 15 m                   | 4.5 s                    |

Table 7: Minimum measurement times for helium

The smallest detectable leak rate of the Ecotec E3000 for helium is  $1 \times 10^{-6}$  mbar l/s (higher than for refrigerant).

You can use a PRO-Check calibrated leak for the internal calibration of helium. Because the PRO-Check calibrated leak does not fit into the opening on the front panel of the Ecotec E3000, you have to connect it with a SUB –D cable, see installation manual of the ECO-Check.

If you are working with diluted helium, you can have the determined leak rate also displayed as the gas-equivalent leak rate. For further details, see "Gas equivalent to helium and hydrogen, settings for diluted gas [▶ 46]."

### Special features with hydrogen / forming gas

If you are sniffing for hydrogen / forming gas, the Ecotec E3000 needs longer for an analysis than with refrigerants. Therefore stick to the following minimum measurement times.

| Length of sniffer line | Minimum measurement time |
|------------------------|--------------------------|
| 3 m                    | 2.7 s                    |
| 5 m                    | 3.0 s                    |
| 10 m                   | 3.8 s                    |
| 15 m                   | 5.0 s                    |

Table 8: Minimum measurement times for hydrogen

If you work with hydrogen (forming gas), you can have the determined leak rate also displayed as gas-equivalent leak rate, see "Gas equivalent to helium and hydrogen, settings for diluted gas [▶ 46]."

If you want to verify hydrogen, the warm-up phase of the device must be extended to 1 hour before the first calibration.

The smallest detectable leak rate of the Ecotec E3000 for hydrogen is  $1 \times 10^{-6}$  mbar l/s (higher than for refrigerant).

You can use a PRO-Check calibrated leak for the internal calibration of hydrogen / forming gas. Because the PRO-Check calibrated leak does not fit into the opening on the front panel of the Ecotec E3000, you have to connect it with a SUB –D cable, see installation manual of the ECO-Check.

### Methane

Methane cannot be calibrated with the built-in ECO-Check because methane can be detected only on mass 15 (which is outside the range for the permissible internal calibration from 40 to 105).

Therefore use the external calibrated leak "TL4-6 for methane" for calibration.

## 6.9 Switch off

### NOTICE

#### Property damage from rotating parts

The turbo molecular pump requires 5 minutes to power down.

- ▶ Allow the turbo molecular pump to power down before any maintenance work is performed or before moving the device.

You can switch off the Ecotec E3000 at any time with the power switch (position "0"). It takes a few minutes for the turbo molecular pump to come to a standstill. The Ecotec E3000 must not be moved during that time.

The parameter set in the Ecotec E3000 are saved. After the start-up, the Ecotec E3000 returns to the same state that it was in before it was switched off.

## 7 Warning and error messages

During operation, the display shows information that supports you in the operation of the Ecotec E3000. Measurement values are displayed along with current device modes, operating instructions as well as warnings and error messages.

The Ecotec E3000 is equipped with extensive self-diagnosis functions. If the electronic system detects a faulty state, the device will show this insofar as possible on the display and will interrupt operation, if necessary.

### Error messages

Errors are events that the Ecotec E3000 cannot remedy itself and that force an interruption of operation. The error message consists of a number and a descriptive text.

After you have removed the cause of the error, start operation again with the restart button.

### Warnings

Warnings warn of device states that can impair the accuracy of measurements. Operation of the instrument is not interrupted

Confirm acknowledgment of the warning with the OK button or the right button on the sniffer handle.

The following table displays all the warnings and error messages. It lists possible causes for the malfunction and instructions on how to eliminate these.

Please note that work marked with an asterisk must be carried out only by service staff that is authorized by INFICON.

| No. | Message   | Possible error sources   | Fault rectification               |
|-----|---|--|-----------------------------------|
| E1  | Input voltage 24V on the MC50 is too low                | Fuse F1 on the wiring board is blown.  | Replace the fuse.*                |
|     |   | CPU board MC50 is defective.   | Contact INFICON customer service. |
| E2  | 24 V input voltage at transpector is too low            | Fuse F2 on the wiring board is blown.  | Replace the fuse.*                |
|     |   | The Transpector is defective.  | Contact INFICON customer service. |
| E3  | Input voltage 24V on the frequency converter is too low | Fuse F3 on the wiring board is blown.  | Replace the fuse.*                |
|     |   | The turbo molecular pump is defective.   | Contact INFICON customer service. |
| W4  | Voltage 24V on OPTION output is too low                 | Fuse F4 on the wiring board is blown.  | Replace the fuse.*                |
|     |   | Power input through external wiring is too high.   | Check the wiring.                 |
| W5  | Voltage 5V on sniffer line is too low                   | Fuse F5 on the wiring board is blown.  | Replace the fuse.*                |
|     |   | The sniffer line is defective.   | Replace the sniffer line.         |
| W24 | Voltage 24V of the external display unit is too low     | Only for Ecotec E3000RC: The fuse on driver board "External operation of the device" is blown. | Replace the fuse.*                |
|     |   | The RC control panel is drawing too much power.  | Contact INFICON customer service. |

| No. | Message   | Possible error sources   | Fault rectification   |
|-----|---|--|---|
| E25 | Remove the sniffer tip from the opening of the calibrated leak!   | The sniffer tip is in the calibration opening of the ECO-Check.                        | Remove the sniffer tip.   |
|     |   | The light barrier of the ECO-Check is soiled.  | Blow out the calibration opening with fresh air or clean it with a cotton cloth.  |
| W28 | Real-time clock was reset! Please enter date and time.  | CPU-board MC50 was replaced.   | Enter the date and time, see Miscellaneous [▶ 32].  |
|     |   | The battery on CPU-board MC50 is defective.  | Contact INFICON customer service.   |
| W29 | Voltage 24V on the audio output is too low!   | Fuse F6 on the wiring board is blown.  | Replace the fuse.*  |
|     |   | The speaker is defective.  | Replace the speaker.*   |
| E30 | Sensitivity too low   | The sensor in the Transpector is defective.  | Contact INFICON customer service.   |
| W31 | Factor K1 outside of range (0.9 to 1.1)!  | Other interfering gases, not cyclopentane or isopentane, were detected, e.g. alcohols. | For new calibration of IGS, see Suppress interfering gases [▶ 48].  |
| W34 | (The flow rate has been reduced by more than 30% since the last calibration. The warning goes out if the flow change is less than 20% again.) | The sniffer line is incorrectly connected.   | Check the connection.   |
|     |   | The sniffer line filters are clogged.  | Change the filter of the sniffer line, see Replacing the filter inserts of the capillary filter and the water conservation tip [▶ 80]. Confirm the work, see Calling up and managing maintenance information [▶ 71]. Perform new calibration of device, see Calibrate [▶ 43]. |
| E38 | Capillary broken! (> 60 s) exceeded. The pumps are switched off to protect the cathodes.)   | The upper limit value is set too low.  | Set the upper limit value for the flow higher, see Vacuum & access control [▶ 36].  |
|     |   | The capillary is broken or leaking.  | Replace the sniffer line.<br>Perform new calibration of device, see Calibrate [▶ 43].<br>Replace the multi-function cable of the sniffer line. Replace the multi-function cable of the sniffer line.*<br>Perform new calibration of device, see Calibrate [▶ 43].             |

| No. | Message   | Possible error sources   | Fault rectification  |
|-----|---|--|--|
| E39 | Emission failure (The emission cannot be switched on at both cathodes.) | If the device was switched off for an extended period of time, this error can occur during the first 10 minutes after start-up.<br><br>Both cathodes are defective.<br><br>The Transpector is defective. | Confirm the error message and restart the device. If the problem still exists: Contact INFICON customer service.             |
| E40 | Emission failed (The emission failed during operation.)                 | If the device was switched off for a longer period of time, this error can occur during the first 10 minutes after start-up.<br><br>The pre-pressure is too high.<br><br>The Transpector is defective.   | Confirm the error message and restart the device. If the problem still exists: Contact INFICON customer service.             |
| E41 | No communication with Transpector!                                      | The software cannot establish the connection with the Transpector.   | Check the connection between Transpector and wiring board.*  |
|     |   | The Transpector is defective.  | Contact INFICON customer service.  |
| E42 | Transpector temperature > 70 °C or < 0 °C!                              | The main air filter is soiled.   | Clean or replace the filter, see Replacing the filter inserts of the capillary filter and the water conservation tip [► 80]. |
|     |   | Confirm the work, see Calling up and managing maintenance information [► 71].  | Use only within the allowed ambient conditions Technical data [► 16].  |
| E43 | Transpector limit value exceeded!                                       | Internal Transpector data error  | Contact INFICON customer service.  |
| E44 | Transpector limit value exceeded!                                       | Internal Transpector data error  | Contact INFICON customer service.  |
| E45 | Transpector limit value exceeded!                                       | Internal Transpector data error  | Contact INFICON customer service.  |
| E46 | Transpector limit value exceeded!                                       | Internal Transpector data error  | Contact INFICON customer service.  |
| E47 | Transpector overpressure!   | If the device was switched off for a longer period of time, this error can occur during the first 10 minutes after start-up.   | Confirm the error message and restart the device. If the problem still exists: Contact INFICON customer service.             |
|     |   | The sniffer line is not connected.   | Connect the sniffer line and confirm the error message. Restart the instrument.  |

| No. | Message  | Possible error sources  | Fault rectification  |
|-----|--|---|--|
| E48 | "Emission failure (The emission failed during operation.)" | The pre-pressure is too high.<br>The Transpector is defective.  | Confirm the error message and restart the device. If the problem still exists: Contact INFICON customer service. |
| W49 | No emission with first cathode                             | Start-up of the Emission failed. The device has switched to the second cathode.                               | You can continue to measure but need to have the cathodes checked.   |
| E50 | Control of turbo pump or electronic system!                | There is an error in the control of the turbo molecular pump.   | Contact INFICON customer service.  |
| E51 | No communication with the turbo controller!                | Wiring board defective<br>CPU board MC50 defective  | Contact INFICON customer service.  |
| W57 | Too many EEPROM write cycles!                              | Continuous change of gas configuration or I*Guide-Program via interface.                                      | Use the alternative commands. (e.g. BEF749 instead of BEF750)  |
| W58 | Measuring parameters inconsistent! Please check!           | The gas library was changed by a software update.   | Perform new selection of the gases to be measured. (The affected gas number is displayed.)                       |
| W59 | Overflow of EEPROM parameter queue!                        | EEPROM defective.   | Contact INFICON customer service.  |
| W60 | All EEPROM parameters lost! Check your settings!           | A new wiring board was installed.   | All settings are reset to factory settings. Make your settings again.  |
|     |  | If the message occurs constantly during running up, the EEPROM on the wiring board is defective.              | Contact INFICON customer service.  |
| W61 | 0 EEPROM parameters initialized!                           | A software update introduced new parameters. The new parameters are listed in the warning.                    | Confirm the warning.   |
|     |  | If the message occurs constantly during running up, the EEPROM on the wiring board is defective.              | Contact INFICON customer service.  |
| W62 | 0 EEPROM parameters lost!                                  | Changed parameters were detected during the running up.<br>The affected parameters are listed in the warning. | Check the settings of the listed parameters.   |
|     |  | If the message occurs constantly during running up, the EEPROM on the wiring board is defective.              | Contact INFICON customer service.  |

| No. | Message                                       | Possible error sources  | Fault rectification   |
|-----|---|---|---|
| W63 | TSP parameters inconsistent! Please check!    | The Transpector was replaced.   | Check the Transpector parameters.   |
|     |   | The wiring board was replaced.  | Contact INFICON customer service.   |
|     |   | The EEPROM on the wiring board is defective.  |   |
| W64 | There are warnings pending!                   | Confirmed but not yet valid warnings are repeated every two hours or at every new start-up.   | Remedy the cause of the warning. Deactivate the warning repetition, see Calling up and managing maintenance information [ ▶ 71].  |
| W65 | TSP serial number inconsistent! Please check! | The Transpector was replaced.   | Contact INFICON customer service.   |
|     |   | The wiring board was replaced.  |   |
|     |   | The EEPROM on the wiring board is defective.  |   |
| W66 | ECO-Check brand-new!                          | A new ECO-Check calibrated leak was connected.  | Enter the serial number and the code of the calibrated leak, refer to the installation manual of the calibrated leak.   |
| W67 | ECO-Check expires on DD.MM.YYYY!              | The validity of the ECO-Check gas store expires in three months.                              | Order an ECO-Check gas store.   |
| W68 | ECO-Check expired!                            | The validity of the ECO-Check gas store is expired (2 years operation or older than 3 years). | Replace the ECO-Check gas store, see installation manual of the ECO-Check.  |
| W70 | All EEPROM parameters of the ECO-Check lost!  | The EEPROM in the ECO-Check calibrated leak is empty or defective.                            | Replace the ECO-Check calibrated leak, see installation manual of the ECO-Check.  |
| W71 | No communication with ECO-Check!              | The ECO-Check calibrated leak cannot be addressed by the basic unit.                          | Check the connection to the ECO-Check calibrated leak.  |
|     |   | No ECO-Check calibrated leak connected.   | If the problem still exists: Contact INFICON customer service.  |
| W72 | No communication with sniffer line!           | The sniffer line cannot be addressed by the basic unit.                                       | Check the connection of the sniffer line with the basic unit (disconnect and reconnect; if possible try a different sniffer line). If the problem still exists, contact INFICON customer service! |
| E73 | Unsuitable sniffer line!                      | The SL3000XL of Protec P3000 was connected accidentally.                                      | Connect the correct sniffer line.   |
| W74 | IC1000 SW version is obsolete!                | A SW update of the IC1000 is required for full functionality.                                 | Please contact INFICON Service.   |

| No. | Message  | Possible error sources   | Fault rectification  |
|-----|--|--|--|
| W75 | No communication with IC1000!  | Communication was established, but has failed.   | Check the connection to the IC1000.  |
| W77 | Changed calibration factor!<br>(Possible message while the calibration is being tested.) | The calibration has changed by more than 15% since the last calibration changed.   | Perform new calibration of device, see Calibrate [▶ 43].   |
| W78 | Signal difference between test leak and air too small. (1.25 for R134a)                  | The calibrated leak is too small.  | Check the leak rate of the calibrated leak or use a calibrated leak with a higher leak rate.   |
|     |  | The calibrated leak is defective.  | Check the background signal by switching off the ZERO function (press the ZERO button longer than 2 s).                                  |
|     |  | The background signal during calibration is too high.  | Perform new calibration of device, see Calibrate [▶ 43].   |
| W79 | Factor outside the range!  | An invalid factor was detected during IGS calibration.   | Repeat the IGS calibration, see Suppress interfering gases [▶ 48].   |
| W80 | Cathode switched over!   | The device was switched over to another cathode without calibration.   | Perform new calibration of device, see Calibrate [▶ 43].   |
| W81 | Calibration factor too small!  | During the internal calibration, the calibration factor was determined to be < 0.1, or < 0.01 during the external calibration. | Check the entry for the leak rate, see Calibrate [▶ 43].   |
|     |  | It was incorrectly calibrated.   | Perform new calibration of device, see Calibrate [▶ 43].   |
|     |  | The leak rate of the calibrated leak is incorrect (especially during external calibration).                                    | Replace the external calibrated leak.  |
| E94 | Error in the TC control unit (E015)  | Defective turbo molecular pump control.  | Switch the instrument off. Wait until the pump has stopped (> 5 min).<br>Switch the device back on.<br>Contact INFICON customer service. |
| E95 | Electronic drive unit does not recognize pump. (E021)                                    | Error in the communication between turbo molecular pump and control.   | Contact INFICON customer service.  |

| No. | Message   | Possible error sources                                | Fault rectification  |
|-----|---|---|--|
| E96 | Error in the temperature control of the TC (E025) | The main air filter is soiled.                        | Clean or replace the filter, see Replacing the filter inserts of the capillary filter and the water conservation tip [▶ 80]. |
|     |   | The ambient temperature is too high.                  | Confirm the work, see Calling up and managing maintenance information [▶ 71].  |
| E97 | Error of the temperature sensor in the TC (E026)  | The temperature sensor is defective.                  | Contact INFICON customer service.  |
| E98 | Error in the motor stage or the control (E037)    | There is an error in the motor stages or the control. | Contact INFICON customer service.  |
| E99 | Error on the power supply (F007)                  | The supply voltage has failed.                        | Contact INFICON customer service.  |

Table 9: Warning and error messages

\* The work may be carried out only by service personnel who have been authorized by INFICON.

# 8 Maintenance

## 8.1 Calling up and managing maintenance information

In the main menu you can call up information regarding the last operational states of the device and its maintenance by selecting “History & maintenance.” Here you will find especially the list of the last error messages. You will also determine which maintenance work has to be confirmed and confirm maintenance.

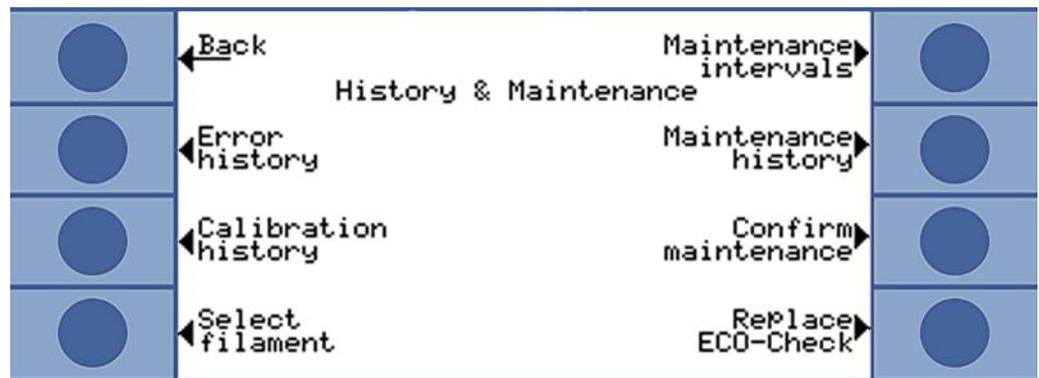


Fig. 39: Selection options in “History & maintenance”

### Error list display

The error list includes the errors and warnings that occurred during the operation of the Ecotec E3000. Date and time are shown followed by an identification for the error or the warning (E... with errors and W... with warnings), with a brief description of the error or the warning.



Fig. 40: List with errors and warnings

To have the full warning or error message displayed, select the appropriate line and press the button with the magnifying glass. Detailed information for possible causes is also specified for many messages.

### Calibration list

This list shows all calibrations that were carried out during the operation of the Ecotec E3000. Information provided includes

- Date and time
- Type of calibration (internal or external)
- Number of gases (only with external calibration)

- Calibration factor

| Date     | Time  | Type       | Gas | Factor |
|----------|-------|------------|-----|--------|
| 21.01.14 | 07:40 | external 1 |     | 0.794  |
| 13.01.14 | 10:33 | external 1 |     | 0.652  |

Fig. 41: Calibration list

To have the complete calibration information displayed, select the appropriate line and press the button with the magnifying glass. The calibration information includes:

- Calibration mode (internal or external), for internal: Gas in calibrated leak
- Gas
  - Internal calibration: one or more gas numbers
  - External calibration: Gas number, mass position, gas
- Date and time of calibration
- Number of operating hours at the time of calibration
- Calibration factor
- Peak position (if different from mass position)
- Flow through sniffer line at the time of calibration
- Cathode that was in use at the time of calibration (A/B)
- Size of the calibrated leak that is used (external calibrated leak for external calibration and ECO-Check for internal calibration)
- Argon flow and mass deviation at the time of calibration
- Flow of the gas that was calibrated and background signal

**Maintenance intervals** To call up the elapsed operating hours of the device since the start-up, select “Maintenance intervals.” The information does not apply to the sniffer line because different lines could have been used.

The remaining operating hours up until the next maintenance work are displayed below.

The times below “Next maintenance for ...” are based on confirmations that you enter after maintenance work.

See "Confirm maintenance" below.

**Maintenance list** The maintenance list shows all maintenance work Maintenance plan [► 76] that was confirmed within the scope of the work. Shown are date and time of completed works, the number of operating hours of the device at the time of the maintenance work and the type of work performed. To have the complete entry displayed, select the appropriate line and press the button with the magnifying glass.

| Date     | Time  | Hours | Maintenance    |
|----------|-------|-------|----------------|
| 08.10.08 | 07:51 | 14260 | Lubricant r... |
| 23.01.08 | 06:36 | 10199 | Wearing Par... |
| 28.11.07 | 16:15 | 9332  | Air filter     |
| 07.04.06 | 10:51 | 2787  | Lubricant r... |
| 07.04.06 | 10:50 | 2787  | Lubricant r... |
| 08.12.05 | 15:27 | 512   | Lubricant r... |

Fig. 42: Entries in a maintenance list

The detailed view also shows maintenance work that you as operator cannot confirm. In order to explain and confirm this work, you have to have special technical knowledge and access to the “Service” menu.

**Confirm maintenance**

In the “Confirm maintenance” menu, confirm the replacement of the oil wick cartridge and the air filter replacement.

Select “Oil wick cartridge” or “Air filter” and then press “OK.” You are then prompted to state whether you want to confirm the maintenance, i.e. make an entry in the maintenance list.

The maintenance intervals for the oil wick cartridge and the air filter of the basic unit are specified and the system will remind you when the interval has elapsed.

**Sniffer filter**

Because the device can be operated with different sniffer lines, any replacement of the filter in the sniffer tip is not subject to the maintenance schedule. Instead, you can enter a period in “Sniffer filter” after which the device will ask you to replace the filter.

Setting range: 10 to 1000 hours and infinite (∞).

Set ∞ if you do want to suppress the request for replacement.

|                       |                     |                       |
|-----------------------|---------------------|-----------------------|
| ← Back                | Confirm maintenance | ? →                   |
| ← Maintenance plan    | Lubricant reservoir | → Lubricant reservoir |
| ← Warning reminder    | Main air filter     | → Main air filter     |
| ← Sniffer line filter |                     | → OK                  |

Fig. 43: Confirming maintenance work

**Maintenance plan**

If you select “Maintenance schedule,” you have the option of deactivating the plan and thus the reminder messages. Under the maintenance schedule menu item, the warning W80 “Cathode switched over!” can be deactivated irrespective of the other reminders.

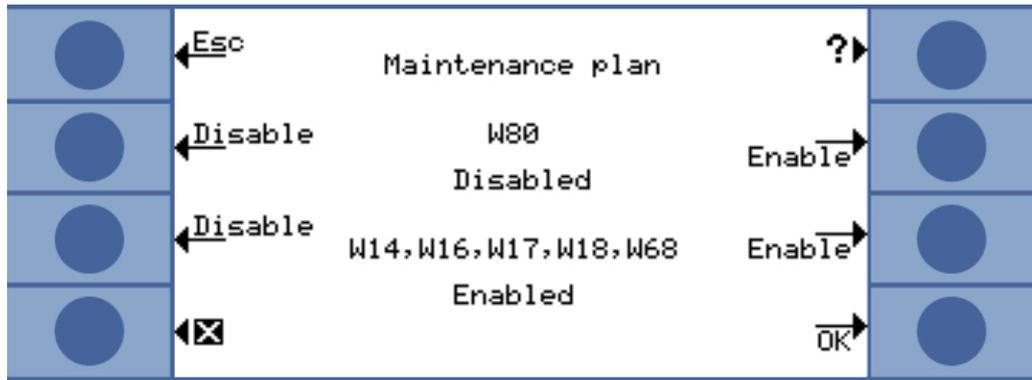


Fig. 44: Maintenance plan

**Repetition of warnings**

If the maintenance schedule is activated but no maintenance work is confirmed, the “Reminder of pending maintenance work” warning will be displayed every two hours. You can deactivate the repeated display of this warning in “Warning repetition.”

**Cathode Selection**

In this window, you can switch from cathode B back to cathode A if the device has independently selected cathode B. The setting can only be made in the idle state and with a stopped turbo molecular pump.

Select the cathode and confirm with “OK.”

**Replacing the ECO-Check**

If an ECO-Check calibrated leak is connected or the gas store of the ECO-Check is replaced, you have to enter the serial number as well as the identification with the calibration data. The installation of the ECO-Check in the Ecotec E3000 as well as the gas store replacement are described in the ECO-Check manual.

The ECO-Check must be connected to the device. You must write down the serial number and the identification on the gas store or you can refer to the supplied certificate for that information.

The appropriate entry window opens with “Replacing the ECO-Check.”

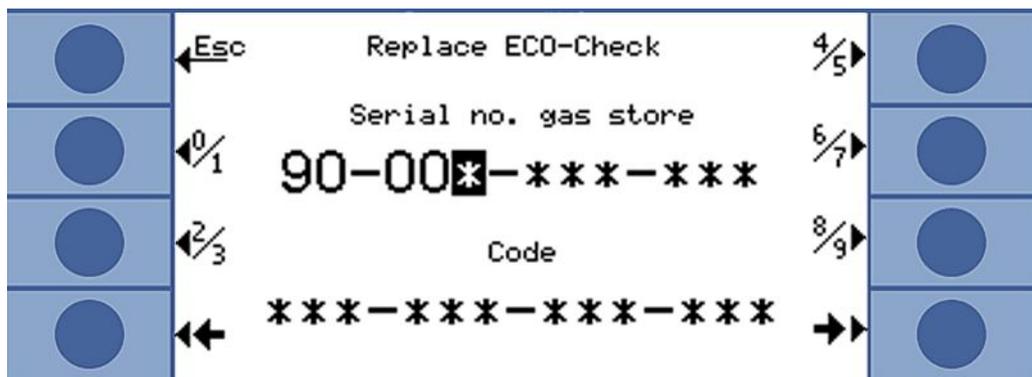


Fig. 45: Enter serial number and identification of the gas store.

The Ecotec E3000 checks the entered number. It will report “Invalid entry” if the ECO-Check cannot be identified with the number.

## 8.2 Maintenance work

Failure to perform the maintenance work specified in the maintenance schedule will void the warranty.

---

** DANGER****Risk of death from electric shock**

There are high voltages inside the device. Touching parts where electrical voltage is present can result in death.

- ▶ Disconnect the device from the power supply prior to any installation and maintenance work.
  - ▶ Ensure that the electrical supply cannot be switched back on unintentionally.
- 

**NOTICE****Property damage from rotating parts**

The turbo molecular pump requires 5 minutes to power down.

- ▶ Allow the turbo molecular pump to power down before any maintenance work is performed or before moving the device.
- 

You will need the following tools for maintenance work:

- 2 screwdrivers, size 2
- Box wrench, 19mm (included in the delivery scope)
- Allen wrench, 8 mm (included in the scope of delivery)
- Allen wrench, 3 mm (not included in the scope of delivery)
- Tweezers

## 8.2.1 Maintenance plan

| Maintenance   | Material description  | Part number | Operating hours |      |       | Period  | Maintenance level |
|---|---|-------------|-----------------|------|-------|---------|-------------------|
|   |   |             | 500             | 2000 | 10000 |         |                   |
| Check the sinter filter of the sniffer tip and replace, if necessary  | Sinter filter for sniffer tip   | 200 03 500  | X <sup>1</sup>  |      |       |         | I                 |
| Replace the filter inserts of the capillary filters and the water protection tip.                               | Felt for capillary filter   | 200 001 116 |                 | X    |       |         | I                 |
| Clean or replace the main air filter in the floor of the housing  | ECOTEC E3000 air filter (104 x 154 mm; 5 pcs.)  | 200 001 552 |                 |      | X     |         | I                 |
| Check internal filters and replace if necessary (three pieces)  | Internal filter   | 200 03 679  |                 |      | X     |         | II                |
| Replace the oil wick cartridge of the turbo molecular pump  | Oil wick cartridge<br>The date on the packaging is the latest possible installation date. | 200 003 801 |                 |      |       | 3 years | II                |
| Replacing the diaphragms of the diaphragm pump  | Wear parts set for diaphragm pump   | 200 03 504  |                 |      | X     |         | III               |
| Replace gas store no later than after 2 years of operation. Maximum shelf life: storage plus operation: 3 years | Replacement gas store   | 531-010     |                 |      |       | 2 years |                   |

Table 10: Maintenance plan

<sup>1</sup> Heavier soiling of the measurement environment can also require earlier replacement.

Explanation of maintenance levels:

Maintenance level I: Customer without any technical training

Maintenance level II: Customer with technical and INFICON training

Maintenance level III: INFICON Service

## 8.2.2 Replacing the air filter of the main unit

The air filter is inside a duct that is accessible from the bottom of the device. The slot is closed with a cover plate. The cover plate is held in place with a 3mm Allen screw.

### DANGER

#### Risk of death from electric shock

There are high voltages inside the device. Touching parts where electrical voltage is present can result in death.

- ▶ Disconnect the device from the power supply prior to any installation and maintenance work.
- ▶ Ensure that the electrical supply cannot be switched back on unintentionally.

### NOTICE

#### Property damage from rotating parts

The turbo molecular pump requires 5 minutes to power down.

- ▶ Allow the turbo molecular pump to power down before any maintenance work is performed or before moving the device.

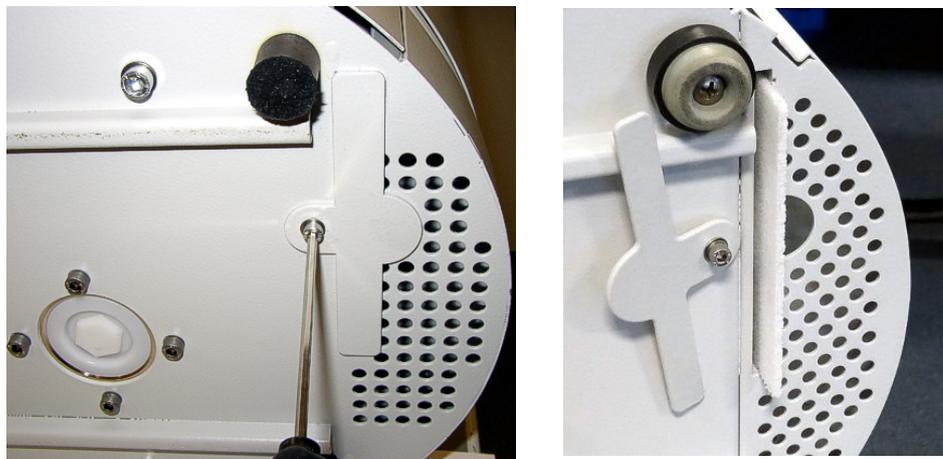


Fig. 46: Loosening the air filter cover

1. Remove the sniffer line and the ECO-Check from the basic unit.
2. Place the basic unit with the front panel on a soft surface.
3. Loosen the screw of the cover plate until you can rotate the cover plate to the side.
4. Pull out the air filter and replace it with a new one.
5. Retighten the cover plate in front of the duct.
6. Put the device back on its feet and connect sniffer line and ECO-Check, if needed.
7. Confirm the work, see "Calling up and managing maintenance information [▶ 71]."

### 8.2.3 Replace operating fluid reservoir.

The oil wick cartridge supplies the turbo molecular pump with lubricant. It consists of a plastic container with a soaked liner and 8 soaked sticks (Porex rods). Plastic container and Porex rods are below the turbo molecular pump and accessible from the bottom of the Ecotec E3000.

The bore for the oil wick cartridge is closed with an aluminum plug and a plastic screw.

The oil wick cartridge has a limited service life and storage period, see "Maintenance plan [▶ 76]."

#### **⚠ DANGER**

##### **Risk of death from electric shock**

There are high voltages inside the device. Touching parts where electrical voltage is present can result in death.

- ▶ Disconnect the device from the power supply prior to any installation and maintenance work.
- ▶ Ensure that the electrical supply cannot be switched back on unintentionally.

#### **⚠ CAUTION**

##### **Danger of poisoning**

The operating fluid reservoir can contain toxic substances from the pumped medium.

- ▶ A data safety sheet for the lubricants is available upon request.
- ▶ Wear appropriate protective clothing, when needed.
- ▶ Dispose of the operating fluid reservoir as stipulated by local regulations.

- 1 Remove the sniffer line and the ECO-Check from the basic unit.
- 2 Place the basic unit with the front panel on a soft surface.
- 3 Unscrew the plastic screw with a 19 mm box wrench.



Fig. 47: Fastener of the operating fluid reservoir

- 4 Lever out the aluminum plug with one or two narrow screw drivers.

- 5 Hook something into the center bore of the plastic container and pull out the plastic container.



Fig. 48: Operating fluid reservoir open

- 6 Pull the eight Porex rods out of the front side of the bore with tweezers.



Fig. 49: Porex rods

- 7 Insert the new Porex rods with tweezers.
- 8 Place the plastic container in the bore with the soaked liner first and close it with the aluminum plug.
- 9 Tighten the plastic screw again. Ensure that the o-ring is placed correctly in the groove of the plastic screw and that the bore is lined up properly.
- 10 Confirm the work, see "Calling up and managing maintenance information [▶ 71]."

## 8.2.4 Replace mains fuses.

The fuses are located behind a flap near the mains switch. They are in two slots.

The mains fuses are available with order no. 200 000 914. Two identical fuses must be used at all times.

## DANGER

### Risk of death from electric shock

There are high voltages inside the device. Touching parts where electrical voltage is present can result in death.

- ▶ Disconnect the device from the power supply prior to any installation and maintenance work.
- ▶ Ensure that the electrical supply cannot be switched back on unintentionally.

- 1 Lever out the cover of the mains plug to the right with a screwdriver.



Fig. 50: Levering out cover to the right

- 2 Pull out the two slots and replace the fuses.



Fig. 51: Slot with fuse

- 3 Push the slots back in. Ensure that the arrows point up.
- 4 Close the flap.

## 8.2.5 Replacing the filter inserts of the capillary filter and the water conservation tip

The plastic capillary filter, the metal capillary filter and the water conservation tip are equipped with filter inserts.

There is a cone seal below the metal capillary filter and the water conservation tip. This seal is already integrated into the plastic capillary filter.

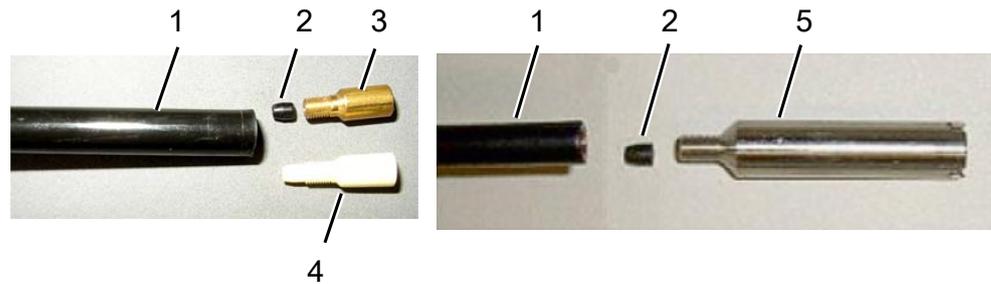


Fig. 52: Capillary filter

|   |                        |   |                          |
|---|------------------------|---|--------------------------|
| 1 | Sniffer line end       | 4 | Plastic capillary filter |
| 2 | Cone seal              | 5 | Water conservation tip   |
| 3 | Metal capillary filter |   |                          |

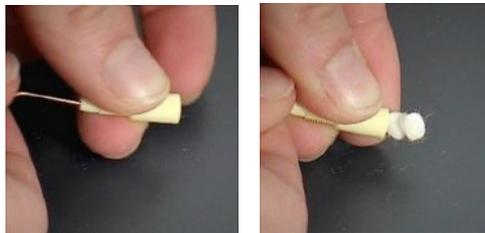


Fig. 53: Pressing the filter inserts out of the capillary filter

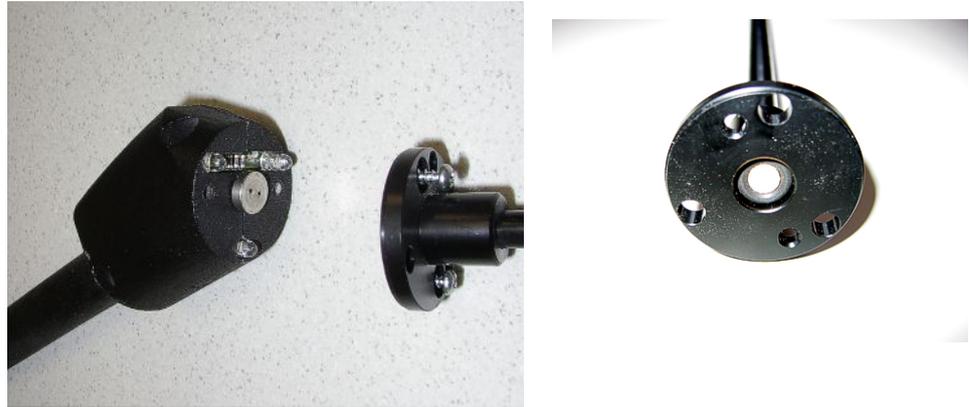
Capillary filter and water conservation tip are screwed onto the sniffer line end.

The filter inserts are inserted and lie in front of a small metal grill that is also inserted.

To replace the filter inserts, proceed as follows:

1. Turn off the Ecotec E3000.
2. Unscrew the capillary filter or the water conservation tip. Make sure that the cone seal does not fall out.
3. Push out the old filter pads and the metal grill from the rear.
4. Dispose of the old inserts and clean the metal grill.
5. Push the metal grill and then the two new inserts into the filter from the front. Make sure that grill and inserts do not cant.
6. Turn on the Ecotec E3000.
7. Close the sniffer tip with your finger. With the water protection tip, you have to also cover the opening on the side. You should then be able to feel a negative pressure. If not then there is a leak somewhere and you have to check the screw connection. The cone seal may also have fallen out.
8. Confirm the work, see "Calling up and managing maintenance information [▶ 71]."
9. Calibrate the Ecotec E3000, see "Calibrate [▶ 43]."

## 8.2.6 Replacing the sinter filter of the sniffer handle



*Fig. 54: Sinter filter in the sniffer handle*

The sinter filter is in the sniffer handle. To replace the filter inserts, proceed as follows:

1. Turn off the Ecotec E3000.
2. Unscrew the two cross-head screws that hold the sniffer tip in place.
3. Remove sinter filter including o-ring.
4. Check the filter for visible soiling.
5. Insert a new sinter filter with o-ring in the base of the filter tip.
6. Tighten the sniffer tip again.
7. Turn on the Ecotec E3000.
8. Close the sniffer tip with your finger. You should be able to feel the underpressure. If not then there is a leak somewhere and you have to check sniffer tip and handle.
9. Confirm the work, see "Calling up and managing maintenance information [▶ 71]."
10. Calibrate the Ecotec E3000, see "Calibrate [▶ 43]."

## 9 Decommissioning

### 9.1 Disposing of the device

The owner can dispose of the device or it can be sent to INFICON.

The device consists of materials that can be recycled. This option should be exercised to prevent waste and also to protect the environment.

- ▶ During disposal, observe the environmental and safety regulations of your country.

### 9.2 Returning the device for maintenance, repair or disposal



#### **⚠ WARNING**

##### **Danger due to harmful substances**

Contaminated devices could endanger health. The contamination declaration serves to protect all persons who come into contact with the device. Devices sent in without a return number and completed contamination declaration will be returned to the sender by the manufacturer.

- ▶ Fill in the declaration of contamination completely.

- 1 Contact the manufacturer and send in a completed declaration of contamination before return shipment.
  - ⇒ You will then receive a return number and the shipping address.
- 2 Use the original packaging when returning.
- 3 Before shipping the instrument, attach a copy of the completed contamination declaration to the outside of the package.

# Declaration of Contamination

The service, repair, and/or disposal of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay.  
 This declaration may only be completed (in block letters) and signed by authorized and qualified staff.

**1 Description of product**

Type \_\_\_\_\_

Article Number \_\_\_\_\_

Serial Number \_\_\_\_\_

**2 Reason for return**

\_\_\_\_\_

\_\_\_\_\_

**3 Operating fluid(s) used (Must be drained before shipping.)**

\_\_\_\_\_

**4 Process related contamination of product:**

|                          |                                |                                 |  |
|--------------------------|--------------------------------|---------------------------------|--|
| toxic                    | no <input type="checkbox"/> 1) | yes <input type="checkbox"/>    |  |
| caustic                  | no <input type="checkbox"/> 1) | yes <input type="checkbox"/>    |  |
| biological hazard        | no <input type="checkbox"/>    | yes <input type="checkbox"/> 2) |  |
| explosive                | no <input type="checkbox"/>    | yes <input type="checkbox"/> 2) |  |
| radioactive              | no <input type="checkbox"/>    | yes <input type="checkbox"/> 2) |  |
| other harmful substances | no <input type="checkbox"/> 1) | yes <input type="checkbox"/>    |  |

2) Products thus contaminated will not be accepted without written evidence of decontamination!

The product is free of any substances which are damaging to health  
 yes

1) or not containing any amount of hazardous residues that exceed the permissible exposure limits

**5 Harmful substances, gases and/or by-products**

Please list all substances, gases, and by-products which the product may have come into contact with:

| Trade/product name | Chemical name (or symbol) | Precautions associated with substance | Action if human contact |
|--------------------|---------------------------|---------------------------------------|-------------------------|
|                    |                           |                                       |                         |
|                    |                           |                                       |                         |
|                    |                           |                                       |                         |

**6 Legally binding declaration:**

I/we hereby declare that the information on this form is complete and accurate and that I/we will assume any further costs that may arise. The contaminated product will be dispatched in accordance with the applicable regulations.

Organization/company \_\_\_\_\_

Address \_\_\_\_\_ Post code, place \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Email \_\_\_\_\_

Name \_\_\_\_\_

Date and legally binding signature \_\_\_\_\_ Company stamp \_\_\_\_\_

Copies:  
 Original for addressee - 1 copy for accompanying documents - 1 copy for file of sender

# 10 Appendix

## 10.1 Accessories

| Accessory part   | Order no. |
|--|-----------|
| Sniffer line   |           |
| SL3000-3, 3 m length   | 525-001   |
| SL3000-5, 5 m length   | 525-002   |
| SL3000-10, 10 m length   | 525-003   |
| SL3000-15, 15 m length   | 525-004   |
| Sniffer line for system integration (robotic application)  | 525-015   |
| Sniffer probes   |           |
| ST 312, 120 mm length, rigid   | 122 13    |
| FT 312, 120 mm length, flexible  | 122 14    |
| FT 200, 200 mm length, rigid   | 122 18    |
| FT 250, 250 mm length, flexible  | 122 66    |
| ST 385, 385 mm length, rigid   | 122 15    |
| FT 385, 385 mm length, flexible  | 122 16    |
| FT 600, 600 mm length, flexible  | 122 09    |
| ST 500, 500 mm length, rigid, 45° angled   | 122 72    |
| Water conservation tip   | 122 46    |
| Holder for SL3000 sniffer line   | 525-006   |
| ECO-Check calibrated leak for R134a  | 531-001   |
| ECO-Check gas store for R134a  | 531-010   |
| PRO-Check calibrated leak  | 521-001   |
| Calibration set for IGS mode   | 531-003   |
| Calibrated leaks for individual refrigerants, leak rate 2–5 g/a, leak rate 16 g/a also available |           |
| R134a  | 122 20    |
| R600a  | 122 21    |
| R404A  | 122 22    |
| R152a  | 122 27    |
| R407C  | 122 28    |
| R410A  | 122 29    |
| R401A  | 122 30    |
| Halon 1301 (R13B1)   | 122 34    |

| Accessory part  | Order no. |
|---|-----------|
| HFO-1234yf  | 122 35    |
| SF6   | 123 00    |
| R245fa  | 123 04    |
| R452A   | 123 05    |
| R441A   | 123 06    |
| Xe  | 123 14    |
| R1234zf   | 123 15    |
| Calibrated leak 100 % hydrogen<br>Leak rate 1.00E-4 mbarl/s for calibration setting with 100 % hydrogen; leak rate 2.01E-3 mbar l/s for calibration setting with 95/5 forming gas | 123 22    |
| Calibrated leak for R290, leak rate 7–8 g/a   | 122 31    |
| Calibrated leak for helium  |           |
| S-TL 4, leak rate range 10 <sup>-4</sup> mbar l/s   | 122 37    |
| S-TL 5, leak rate range 10 <sup>-5</sup> mbar l/s   | 122 38    |
| S-TL 6, leak rate range 10 <sup>-6</sup> mbar l/s   | 122 39    |
| Calibrated leak for methane, TL4-6  | 122 49    |
| Calibrated leaks for other refrigerants on request  |           |
| External display unit for Ecotec E3000RC  |           |
| for use as table device   | 551-100   |
| for rack mounting   | 551-101   |
| Connecting cable for external display unit  |           |
| for Ecotec E3000RC, 5 m   | 551-102   |
| for Ecotec E3000RC, 1 m   | 551-103   |
| Module  |           |
| IC1000  | 525-200   |
| Data cable, 0.5 m IC1000 <-> BM1000   | 560-334   |
| Bus module  |           |
| BM1000 PROFIBUS   | 560-315   |
| BM1000 PROFINET IO  | 560-316   |
| BM1000 DeviceNet  | 560-317   |
| BM1000 EtherNet/IP  | 560-318   |

## 10.2 Gas library

The software of the Ecotec E3000 includes a list with approx. 100 gases that can be relevant for the refrigeration industry. These gases are saved to ROM (read only memory) and can be selected from the list in the appropriate menus for gases and trigger values. Mass number (measuring position), molecular mass, normalization factor and viscosity are stored for each one. The data in this ROM cannot be changed. The program additionally provides six empty memory spaces (user library RAM memory). The user can save personally defined gases to them, see "Setting Custom Gas [▶ 49]."

The pre-set mass number (measuring position) has a gray background for each gas.

| Gas   | Formula  | Other designation | Measuring position<br>(xxx amu) | Molecular mass<br>(xxx.x amu) | Fragmentation factor | Normalization factor<br>(x.xE <sup>xx</sup> ) | Viscosity |
|-------|--|-------------------|---------------------------------|-------------------------------|----------------------|---|-----------|
| R12B1 | CF <sub>2</sub> ClBr                           | Halon 1211        | 85                              | 165.4                         | 1.00                 | 1.40E+08                                      | 0.523     |
|       |  |                   | 87                              |                               | 0.32                 |   |           |
|       |  |                   | 50                              |                               | 0.12                 |   |           |
|       |  |                   | 129                             |                               | 0.15                 |   |           |
|       |  |                   | 131                             |                               | 0.15                 |   |           |
| R13B1 | CF <sub>3</sub> Br                             | Halon 1301        | 69                              | 149                           | 1.00                 | 3.50E+07                                      | 0.852     |
|       |  |                   | 129                             |                               | 0.12                 |   |           |
|       |  |                   | 131                             |                               | 0.12                 |   |           |
|       |  |                   | 148                             |                               | 0.10                 |   |           |
|       |  |                   | 150                             |                               | 0.10                 |   |           |
| R32   | CH <sub>2</sub> F <sub>2</sub>                 |                   | 51                              | 52                            | 1.00                 | 1.90E+08                                      | 0.632     |
|       |  |                   | 52                              |                               | 0.10                 |   |           |
| R41   | CH <sub>3</sub> F                              |                   | 34                              | 34                            | 1.00                 | 7.00E+07                                      | 0.551     |
|       |  |                   | 33                              |                               | 1.00                 |   |           |
| R50   | CH <sub>4</sub>                                | Methane           | 15                              | 16                            | 1.00                 | 7.00E+07                                      | 0.556     |
| R116  | C <sub>2</sub> F <sub>6</sub>                  |                   | 69                              | 138                           | 1.00                 | 7.00E+07                                      | 0.709     |
|       |  |                   | 119                             |                               | 1.00                 |   |           |
| R123  | C <sub>2</sub> HF <sub>3</sub> Cl <sub>2</sub> |                   | 83                              | 152.9                         | 1.00                 | 7.00E+07                                      | 0.540     |
|       |  |                   | 85                              |                               | 1.00                 |   |           |
| R124  | C <sub>2</sub> HF <sub>4</sub> Cl              |                   | 67                              | 136.5                         | 1.00                 | 7.00E+07                                      | 0.581     |
|       |  |                   | 51                              |                               | 1.00                 |   |           |
| R125  | C <sub>2</sub> HF <sub>5</sub>                 |                   | 51                              | 120                           | 1.00                 | 6.70E+07                                      | 0.653     |
|       |  |                   | 69                              |                               | 0.27                 |   |           |
|       |  |                   | 101                             |                               | 0.35                 |   |           |

| Gas    | Formula                                       | Other designation | Measuring position (xxx amu) | Molecular mass (xxx.x amu) | Fragmentation factor | Normalization factor (x.xE <sup>xx</sup> ) | Viscosity |
|--------|---|-------------------|------------------------------|----------------------------|----------------------|--|-----------|
| R134a  | C <sub>2</sub> H <sub>2</sub> F <sub>4</sub>  |                   | 69                           | 102                        | 0.72                 | 1.10E+08                                   | 0.591     |
|        |   |                   | 83                           |                            | 0.46                 |  |           |
|        |   |                   | 51                           |                            | 0.12                 |  |           |
| R143a  | C <sub>2</sub> H <sub>3</sub> F <sub>3</sub>  |                   | 69                           | 84                         | 1.00                 | 7.00E+07                                   | 0.561     |
|        |   |                   | 65                           |                            | 0.35                 |  |           |
| R152a  | C <sub>2</sub> H <sub>4</sub> F <sub>2</sub>  |                   | 51                           | 66.1                       | 1.00                 | 8.70E+07                                   | 0.515     |
|        |   |                   | 65                           |                            | 0.47                 |  |           |
| R170   | C <sub>2</sub> H <sub>6</sub>                 | Ethane            | 26                           | 30.1                       | 1.00                 | 7.00E+07                                   | 0.479     |
| R218   | C <sub>3</sub> F <sub>8</sub>                 |                   | 69                           | 188                        | 1.00                 | 2.90E+07                                   | 0.627     |
|        |   |                   | 169                          |                            | 0.25                 |  |           |
| R227ea | C <sub>3</sub> HF <sub>7</sub>                |                   | 69                           | 170                        | 1.00                 | 8.80E+07                                   | 0.627     |
|        |   |                   | 51                           |                            | 0.18                 |  |           |
|        |   |                   | 82                           |                            | 0.15                 |  |           |
| R236fa | C <sub>3</sub> H <sub>2</sub> F <sub>6</sub>  |                   | 69                           | 152                        | 1.00                 | 3.90E+07                                   | 0.550     |
|        |   |                   | 64                           |                            | 0.34                 |  |           |
|        |   |                   | 133                          |                            | 0.30                 |  |           |
|        |   |                   | 113                          |                            | 0.06                 |  |           |
| R245fa | C <sub>3</sub> H <sub>3</sub> F <sub>5</sub>  |                   | 64                           | 134                        | 0.58                 | 6.50E+07                                   | 0.520     |
|        |   |                   | 51                           |                            | 1.00                 |  |           |
|        |   |                   | 69                           |                            | 0.32                 |  |           |
|        |   |                   | 95                           |                            | 0.03                 |  |           |
|        |   |                   | 115                          |                            | 0.13                 |  |           |
| R290   | C <sub>3</sub> H <sub>8</sub>                 | Propane           | 41                           | 44.1                       | 0.91                 | 9.10E+08                                   | 0.433     |
|        |   |                   | 39                           |                            | 1.00                 |  |           |
|        |   |                   | 42                           |                            | 0.32                 |  |           |
| R356   | C <sub>4</sub> H <sub>5</sub> F <sub>5</sub>  |                   | 77                           | 166.1                      | 1.00                 | 7.00E+07                                   | 0.561     |
|        |   |                   | 69                           |                            | 1.00                 |  |           |
| R404A  | 44 %<br>R125<br>52 %<br>R143a<br>4 %<br>R134a |                   | 69                           | 97.6                       | 1.00                 | 9.30E+07                                   | 0.607     |
|        |   |                   | 51                           |                            | 0.52                 |  |           |
|        |   |                   | 101                          |                            | 0.23                 |  |           |

| Gas   | Formula                                      | Other designation | Measuring position (xxx amu) | Molecular mass (xxx.x amu) | Fragmentation factor | Normalization factor (x.xE <sup>xx</sup> ) | Viscosity |
|-------|--|-------------------|------------------------------|----------------------------|----------------------|--|-----------|
| R406A | 55 %<br>R22<br>4 %<br>R600a<br>41 %<br>R142b |                   | 51                           | 89.9                       | 1.00                 | 7.00E+07                                   | 0.566     |
|       |  |                   | 65                           |                            | 1.00                 |  |           |
| R407A | 20 %<br>R32<br>40 %<br>R125<br>40 %<br>R134a |                   | 51                           | 90.1                       | 1.00                 | 7.00E+07                                   | 0.637     |
|       |  |                   | 69                           |                            | 1.00                 |  |           |
| R407B | 10 %<br>R32<br>70 %<br>R125<br>20 %<br>R134a |                   | 51                           | 102.9                      | 1.00                 | 7.00E+07                                   | 0.647     |
|       |  |                   | 101                          |                            | 1.00                 |  |           |
| R407C | 10 %<br>R32<br>70 %<br>R125<br>20 %<br>R134a |                   | 51                           | 86.2                       | 1.00                 | 1.80E+08                                   | 0.627     |
|       |  |                   | 69                           |                            | 0.75                 |  |           |
|       |  |                   | 83                           |                            | 0.38                 |  |           |
| R407D | 23 %<br>R32<br>25 %<br>R125<br>52 %<br>R134a |                   | 69                           | 91                         | 1.00                 | 7.00E+07                                   | 0.612     |
|       |  |                   | 83                           |                            | 1.00                 |  |           |
| R407E | 25 %<br>R32<br>15 %<br>R125<br>60 %<br>R134a |                   | 51                           | 83.8                       | 1.00                 | 7.00E+07                                   | 0.622     |
|       |  |                   | 69                           |                            | 1.00                 |  |           |

| Gas   | Formula         | Other designation | Measuring position (xxx amu) | Molecular mass (xxx.x amu) | Fragmentation factor | Normalization factor (x.xE <sup>xx</sup> ) | Viscosity |
|-------|-----------------|-------------------|------------------------------|----------------------------|----------------------|--|-----------|
| R407F | 40 %<br>R134a   |                   | 51                           | 82.1                       | 1.00                 | 1.90E+08                                   | 0.670     |
|       |                 |                   | 69                           |                            | 0.35                 |  |           |
| R410A | 30 %<br>R125    |                   |                              |                            |                      |  |           |
|       |                 |                   | 30 %<br>R32                  |                            |                      |  |           |
|       |                 |                   | 50 %<br>R125                 |                            |                      |  |           |
| R410A | 50 %<br>R32     |                   | 51                           | 72.6                       | 1.00                 | 1.20E+08                                   | 0.673     |
|       |                 |                   | 101                          |                            | 0.26                 |  |           |
|       |                 |                   | 69                           |                            | 0.14                 |  |           |
| R410B | 45 %<br>R32     |                   | 51                           | 75.6                       | 1.00                 | 7.00E+07                                   | 0.673     |
|       |                 |                   | 101                          |                            | 0.35                 |  |           |
| R410B | 55 %<br>R125    |                   |                              |                            |                      |  |           |
|       |                 |                   |                              |                            |                      |  |           |
| R413A | 9 %<br>R218     |                   | 69                           | 104                        | 1.00                 | 7.00E+07                                   | 0.581     |
|       |                 |                   | 83                           |                            | 1.00                 |  |           |
| R413A | 88 %<br>R134a   |                   |                              |                            |                      |  |           |
|       |                 |                   | 3 %<br>R600                  |                            |                      |  |           |
|       |                 |                   |                              |                            |                      |  |           |
| R417A | 50 %<br>R134a   |                   | 51                           | 106.7                      | 1.00                 | 1.80E+08                                   | 0.610     |
|       |                 |                   | 69                           |                            | 0.70                 |  |           |
|       |                 |                   | 83                           |                            | 0.22                 |  |           |
| R417A | 46 %<br>R125    |                   |                              |                            |                      |  |           |
|       |                 |                   | 4 %<br>R600a                 |                            |                      |  |           |
|       |                 |                   |                              |                            |                      |  |           |
| R422D | 65.1 %<br>R125  |                   | 51                           | 112.2                      | 1.00                 | 8.78E+07                                   | 0.622     |
|       |                 |                   | 69                           |                            | 0.36                 |  |           |
| R422D | 31.5 %<br>R134a |                   |                              |                            |                      |  |           |
|       |                 |                   | 3.4 %<br>R600a               |                            |                      |  |           |

| Gas   | Formula         | Other designation | Measuring position (xxx amu) | Molecular mass (xxx.x amu) | Fragmentation factor | Normalization factor (x.xE <sup>xx</sup> ) | Viscosity |
|-------|-----------------|-------------------|------------------------------|----------------------------|----------------------|--|-----------|
| R438A | 45 %<br>R125    |                   | 51                           | 104.9                      | 1.00                 | 1.04E+08                                   | 0.617     |
|       | 44.2 %<br>R134a |                   | 69                           |                            | 0.42                 |  |           |
| R441A | 8.5 %<br>R32    |                   |                              |                            |                      |  |           |
|       | 1.7 %<br>R600   |                   |                              |                            |                      |  |           |
| R442A | 0.6 %<br>R601a  |                   |                              |                            |                      |  |           |
|       | 54.8 %<br>R290  |                   | 43                           | 49.6                       | 1.00                 | 7.80E+08                                   | 0.398     |
| R442A | 36.1 %<br>R600  |                   | 41                           |                            | 0.59                 |  |           |
|       | 6 %<br>R600a    |                   |                              |                            |                      |  |           |
| R442A | 3.1 %<br>R170   |                   |                              |                            |                      |  |           |
|       | 31 %<br>R32     |                   | 51                           | 81.8                       | 1.00                 | 2.40E+08                                   | 0.629     |
| R442A | 31 %<br>R125    |                   | 69                           |                            | 0.33                 |  |           |
|       | 30 %<br>R134a   |                   |                              |                            |                      |  |           |
| R442A | 5 %<br>R227ea   |                   |                              |                            |                      |  |           |
|       | 3 %<br>R152a    |                   |                              |                            |                      |  |           |

| Gas   | Formula        | Other designation | Measuring position (xxx amu) | Molecular mass (xxx.x amu) | Fragmentation factor | Normalization factor (x.xE <sup>xx</sup> ) | Viscosity |
|-------|----------------|-------------------|------------------------------|----------------------------|----------------------|--|-----------|
| R448A | 26 % R32       |                   | 51                           | 99.3                       | 1.00                 | 1.10E+08                                   | 0.625     |
|       |                |                   | 69                           |                            | 0.38                 |  |           |
|       | 26 % R125      |                   | 64                           |                            | 0.13                 |  |           |
|       | 21 % R134a     |                   |                              |                            |                      |  |           |
|       | 20 % R1234yf   |                   |                              |                            |                      |  |           |
|       | 7 % R1234ze    |                   |                              |                            |                      |  |           |
| R449A | 25.7 % R134    |                   | 51                           | 87.2                       | 1.00                 | 2.10E+08                                   | 0.622     |
|       |                |                   | 69                           |                            | 0.48                 |  |           |
|       | 25.3 % R1234yf |                   | 64                           |                            | 0.15                 |  |           |
|       | 24.7 % R125    |                   |                              |                            |                      |  |           |
|       | 24.3 % R32     |                   |                              |                            |                      |  |           |
| R450A | 58 % R1234ze   |                   | 69                           | 109                        | 1.00                 | 1.91E+08                                   | 0.592     |
|       |                |                   | 83                           |                            | 0.37                 |  |           |
|       | 42 % R134a     |                   | 64                           |                            | 0.33                 |  |           |
|       |                |                   | 51                           |                            | 0.22                 |  |           |
|       |                |                   | 95                           |                            | 0.17                 |  |           |
| R452A | 59 % R125      |                   | 51                           | 103.5                      | 1.00                 | 1.30E+08                                   | 0.612     |
|       |                |                   | 69                           |                            | 0.32                 |  |           |
|       | 30 % R1234yf   |                   | 64                           |                            | 0.12                 |  |           |
|       | 11 % R32       |                   |                              |                            |                      |  |           |
| R452B | 67 % R32       |                   | 51                           | 72.9                       | 1.00                 | 2.34E+08                                   | 0.639     |
|       |                |                   | 69                           |                            | 0.39                 |  |           |
|       | 26 % R1234yf   |                   | 64                           |                            | 0.31                 |  |           |
|       | 7 % R125       |                   |                              |                            |                      |  |           |

| Gas   | Formula                          | Other designation | Measuring position (xxx amu) | Molecular mass (xxx.x amu) | Fragmentation factor | Normalization factor (x.xE <sup>xx</sup> ) | Viscosity |
|-------|----------------------------------|-------------------|------------------------------|----------------------------|----------------------|--|-----------|
| R454B |                                  |                   | 51                           | 62.6                       | 1.00                 | 2.30E+08                                   | 0.638     |
|       |                                  |                   | 64                           |                            | 0.18                 |  |           |
|       |                                  |                   | 69                           |                            | 0.19                 |  |           |
|       |                                  |                   | 95                           |                            | 0.07                 |  |           |
| R454C |                                  |                   | 69                           | 90.8                       | 1                    | 3.72E+08                                   | 0.62      |
|       |                                  |                   | 64                           |                            | 1                    |  |           |
|       |                                  |                   | 51                           |                            | 1                    |  |           |
|       |                                  |                   | 95                           |                            | 0.26                 |  |           |
| R507  | 50 %<br>R125<br>50 %<br>R143a    |                   | 69                           | 98.9                       | 1.00                 | 8.10E+07                                   | 0.612     |
|       |                                  |                   | 51                           |                            | 0.58                 |  |           |
|       |                                  |                   | 65                           |                            | 0.17                 |  |           |
| R508A | 39 %<br>R23<br>61 %<br>R116      |                   | 69                           | 100.1                      | 1.00                 | 7.00E+07                                   | 0.729     |
|       |                                  |                   | 51                           |                            | 0.35                 |  |           |
| R508B | 46 %<br>R23<br>54 %<br>R116      |                   | 69                           | 95.4                       | 1.00                 | 8.60E+07                                   | 0.729     |
|       |                                  |                   | 51                           |                            | 0.20                 |  |           |
|       |                                  |                   | 119                          |                            | 0.23                 |  |           |
| R513A | 44 %<br>R134a<br>56 %<br>R1234yf |                   | 69                           | 108.7                      | 1.00                 | 1.70E+08                                   | 0.582     |
|       |                                  |                   | 64                           |                            | 0.60                 |  |           |
|       |                                  |                   | 83                           |                            | 0.34                 |  |           |
| R600  | C <sub>4</sub> H <sub>10</sub>   | Butane            | 41                           | 58.1                       | 1.00                 | 7.00E+07                                   | 0.377     |
|       |                                  |                   | 42                           |                            | 1.00                 |  |           |
| R600a | C <sub>4</sub> H <sub>10</sub>   | Isobutane         | 41                           | 58.1                       | 1.00                 | 2.60E+08                                   | 0.377     |
|       |                                  |                   | 42                           |                            | 0.75                 |  |           |
|       |                                  |                   | 43                           |                            | 1.00                 |  |           |
|       |                                  |                   | 58                           |                            | 0.08                 |  |           |
|       |                                  |                   | IGS                          |                            | 0.91                 |  |           |
| R601  | C <sub>5</sub> H <sub>12</sub>   | Pentane           | 41                           | 72.2                       | 1.00                 | 7.00E+07                                   | 0.341     |
|       |                                  |                   | 42                           |                            | 1.00                 |  |           |
|       |                                  |                   | 43                           |                            | 1.00                 |  |           |

| Gas              | Formula  | Other designation | Measuring position (xxx amu) | Molecular mass (xxx.x amu) | Fragmentation factor | Normalization factor (x.xExx) | Viscosity |
|------------------|--|-------------------|------------------------------|----------------------------|----------------------|-------------------------------|-----------|
| R601a            | C <sub>5</sub> H <sub>12</sub>                 | Isopentane        | 41                           | 72.2                       | 0.60                 | 8.00E+07                      | 0.336     |
|                  |  |                   | 42                           |                            | 0.84                 |                               |           |
|                  |  |                   | 43                           |                            | 1.00                 |                               |           |
|                  |  |                   | 57                           |                            | 0.36                 |                               |           |
|                  |  |                   | 56                           |                            | 0.12                 |                               |           |
| R601b            | C <sub>5</sub> H <sub>12</sub>                 | Neo-pentane       | 57                           | 72.2                       | 1.00                 | 7.00E+07                      | 0.337     |
| R601c            | C <sub>5</sub> H <sub>12</sub>                 | Cyclo-pentane     | 41                           | 70.1                       | 0.30                 | 7.00E+07                      | 0.337     |
|                  |  |                   | 42                           |                            | 1.00                 |                               |           |
|                  |  |                   | 70                           |                            | 0.29                 |                               |           |
|                  |  |                   | 55                           |                            | 0.28                 |                               |           |
|                  |  |                   | 39                           |                            | 0.21                 |                               |           |
| R1233zd          | C <sub>3</sub> H <sub>2</sub> ClF <sub>3</sub> |                   | 95                           | 130.5                      | 1.00                 | 5.10E+08                      | 0.558     |
|                  |  |                   | 69                           |                            | 0.62                 |                               |           |
|                  |  |                   | 80                           |                            | 0.14                 |                               |           |
|                  |  |                   | 130                          |                            | 0.30                 |                               |           |
| R1234yf          | C <sub>3</sub> H <sub>2</sub> F <sub>4</sub>   |                   | 69                           | 114                        | 1.00                 | 1.60E+08                      | 0.624     |
|                  |  |                   | 64                           |                            | 0.99                 |                               |           |
|                  |  |                   | 95                           |                            | 0.36                 |                               |           |
|                  |  |                   | 114                          |                            | 0.50                 |                               |           |
| R1234ze          | C <sub>3</sub> H <sub>2</sub> F <sub>4</sub>   |                   | 69                           | 114                        | 1.00                 | 3.40E+08                      | 0.619     |
|                  |  |                   | 64                           |                            | 0.82                 |                               |           |
|                  |  |                   | 95                           |                            | 0.48                 |                               |           |
| R1243zf          | C <sub>3</sub> H <sub>3</sub> F <sub>3</sub>   |                   | 95                           | 96                         | 1.00                 | 2.90E+08                      | 0.600     |
|                  |  |                   | 77                           |                            | 0.52                 |                               |           |
|                  |  |                   | 51                           |                            | 0.48                 |                               |           |
|                  |  |                   | 69                           |                            | 0.41                 |                               |           |
|                  |  |                   | 96                           |                            | 0.85                 |                               |           |
| R1270            | C <sub>3</sub> H <sub>6</sub>                  | Propene           | 41                           | 44.1                       | 1.00                 | 3.50E+08                      | 0.433     |
|                  |  |                   | 39                           |                            | 0.7                  |                               |           |
|                  |  |                   | 42                           |                            | 0.62                 |                               |           |
| Ar               |  | Argon             | 40                           | 40                         | 1.00                 | 7.00E+07                      | 1.127     |
| CO <sub>2</sub>  |  | R744              | 44                           | 44                         | 1.00                 | 1.00E+08                      | 0.744     |
| H <sub>2</sub>   |  | Hydrogen          | 2                            | 2                          | 1.00                 | 5.00E+06                      | 0.448     |
| H <sub>2</sub> O |  | R718              | 18                           | 18                         | 1.00                 | 7.00E+07                      | 0.459     |

| Gas             | Formula | Other designation | Measuring position (xxx amu) | Molecular mass (xxx.x amu) | Fragmentation factor | Normalization factor (x.xE <sup>xx</sup> ) | Viscosity |
|-----------------|---------|-------------------|------------------------------|----------------------------|----------------------|--|-----------|
| He              |         | Helium            | 4                            | 4                          | 1.00                 | 3.00E+07                                   | 1.000     |
| CO <sub>2</sub> |         | R744              | 44                           | 44                         | 1.00                 | 1.00E+08                                   | 0.744     |
| HT135           |         | Galden HT135      | 100                          | 610                        | 0.08                 | 1.20E+07                                   | 1.000     |
|                 |         |                   | 69                           |                            | 1.00                 |  |           |
|                 |         |                   | 119                          |                            | 0.45                 |  |           |
|                 |         |                   | 169                          |                            | 0.42                 |  |           |
|                 |         |                   | 131                          |                            | 0.03                 |  |           |
| Kr              |         | Krypton           | 84                           | 84                         | 1.00                 | 7.00E+07                                   | 1.275     |
| N <sub>2</sub>  |         | Nitrogen          | 28                           | 28                         | 1.00                 | 7.00E+07                                   | 0.892     |
| Ne              |         | Neon              | 20                           | 20.2                       | 1.00                 | 7.00E+07                                   | 1.586     |
| NH <sub>3</sub> |         | R717              | 17                           | 17                         | 1.00                 | 7.00E+07                                   | 0.505     |
| O <sub>2</sub>  |         | Oxygen            | 32                           | 32                         | 1.00                 | 7.00E+07                                   | 1.030     |
| SF <sub>6</sub> |         |                   | 127                          | 146.1                      | 0.80                 | 9.10E+07                                   | 0.765     |
| Xe              |         | Xenon             | 129                          | 131.3                      | 1.00                 | 1.20E+08                                   | 1.153     |
|                 |         |                   | 132                          |                            | 1.00                 |  |           |
| ZT130           |         | Galden ZT130      | 100                          | 497                        | 0.25                 | 7.00E+07                                   | 1.000     |
|                 |         |                   | 117                          |                            | 0.32                 |  |           |
|                 |         |                   | 119                          |                            | 1.00                 |  |           |
|                 |         |                   | 69                           |                            | 0.50                 |  |           |
|                 |         |                   | 135                          |                            | 0.12                 |  |           |

Table 11: Gas library

### 10.3 Menu tree

|                        |                           |                         |                   |
|------------------------|---------------------------|-------------------------|-------------------|
| 2 Start / sleep        |                           |                         |                   |
| 3 Service              | Service PIN               |                         |                   |
| 5 Measuring parameters | 5 Gas 1                   | Gas                     | 8 Change          |
|                        | 6 Gas 2                   | Status                  |                   |
|                        | 7 Gas 3                   | Trigger&Unit            |                   |
|                        | 8 Gas 4                   | Display limit           |                   |
|                        |                           | Internal calibration    |                   |
|                        |                           | Mass and position       |                   |
|                        |                           | Calibration factor      |                   |
|                        |                           | Last calibration        |                   |
|                        |                           | Calibration method      |                   |
|                        | Gas def.                  | Gas definition          | 8 Change          |
|                        |                           | Name                    |                   |
|                        |                           | Measuring mass          |                   |
|                        |                           | Standard factor         |                   |
| Molecular mass         |                           |                         |                   |
| 6 Settings             | 2 Vacuum & access control | 2 Zero                  |                   |
|                        |                           | 3 Zero time             |                   |
|                        |                           | 5 Flow limits           | upper flow limit  |
|                        |                           |                         | lower flow limit  |
|                        |                           | 6 Monitoring            | Sensitivity       |
|                        |                           |                         | Automatic cathode |
|                        |                           | 7 Calibration           |                   |
|                        | 8 Change menu PIN         |                         |                   |
|                        | 3 Audio                   | 2 Audio acknowledgement |                   |
|                        |                           | 3 Device speaker        |                   |
|                        |                           | 5 Handle speaker        |                   |
|                        |                           | 6 Alarm profile         |                   |
|                        |                           | 7 Volume level          |                   |

|                        |                   |                         |                            |
|------------------------|-------------------|-------------------------|----------------------------|
| 6 Settings (continued) | 5 I-Guide setting | 2 I-Guide ON/OFF        |                            |
|                        |                   | PGM. 1...10             | 3 Change:                  |
|                        |                   |                         | Name                       |
|                        |                   |                         | Gas type A                 |
|                        |                   |                         | Gas type B                 |
|                        |                   |                         | Trigger value A            |
|                        |                   |                         | Trigger value B            |
|                        |                   |                         | Number of measuring points |
|                        |                   |                         | Measuring time             |
|                        |                   |                         | Idle time                  |
|                        |                   | 4 Key ON/OFF            |                            |
|                        | 6 Miscellaneous   | 2 Language              |                            |
|                        |                   | 3 Date & time           |                            |
|                        |                   | 4 Sniffer line lighting |                            |
|                        |                   | 5 Pressure unit         |                            |
|                        |                   | 6 Leak rate filter      |                            |
|                        |                   | 7 Alarm delay           |                            |
|                        |                   | 8 Wake up               |                            |
|                        | 7 Display         | 2 Contrast              |                            |
|                        |                   |                         |                            |
|                        |                   | 3 Max. value            |                            |
|                        |                   | 6 Gas display handle    |                            |
|                        | 8 Interfaces      | 2 Control location      |                            |
| 3 Recorder output      |                   | 6 Scaling recorder      |                            |
|                        |                   | 7 Gas recorder          |                            |
| 5 PLC setting          |                   | 6 Defining SPS inputs   |                            |
|                        |                   | 7 Defining SPS outputs  |                            |
| 6 RS232 protocol       |                   |                         |                            |
| 7 RS232 settings       |                   |                         |                            |
| 8 ECO-Check            |                   |                         |                            |

|                             |                                |                        |                      |  |
|-----------------------------|--------------------------------|------------------------|----------------------|--|
| 7 History&maintenance       | 2 Error list display           |                        |                      |  |
|                             | 3 Calibration list display     |                        |                      |  |
|                             | 4 Cathode selection            |                        |                      |  |
|                             | 5 Maintenance intervals        |                        |                      |  |
|                             | 6 Maintenance list display     |                        |                      |  |
|                             | 7 Confirm maintenance          | 2 Maintenance schedule |                      |  |
|                             |                                |                        |                      |  |
|                             |                                | 3 Warning repetition   |                      |  |
| 4 Sniffer line filter       |                                |                        |                      |  |
| 6 Operating fluid reservoir |                                |                        |                      |  |
|                             | 7 Air filter                   |                        |                      |  |
|                             | 8 Replace ECO-Check            |                        |                      |  |
| 8 Information               | 1/11 General information       |                        |                      |  |
|                             | 2/11 Turbo pump                |                        |                      |  |
|                             | 3/11 Transpector               |                        |                      |  |
|                             | 4/11 ECO-Check                 |                        |                      |  |
|                             | 5/11 Sniffer line              |                        |                      |  |
|                             | 6/11 I/O port                  |                        |                      |  |
|                             | 7/11 Analog                    |                        |                      |  |
|                             | 8/11 Analog (2)                |                        |                      |  |
|                             | 9/11 RS232                     |                        |                      |  |
|                             | 10/11 Info field bus           | CAL -->                | External calibration |  |
|                             | 11/11 Info field bus<br>BM1000 |                        | Adjust IGS           |  |

Table 12: Menu tree of Ecotec E3000

## 10.4 CE Declaration of Conformity



### *EU Declaration of Conformity*

We – INFICON GmbH - herewith declare that the products defined below meet the basic requirements regarding safety and health and relevant provisions of the relevant EU Directives by design, type and the versions which are brought into circulation by us. This declaration of conformity is issued under the sole responsibility of INFICON GmbH.

In case of any products changes made without our approval, this declaration will be void

The products meet the requirements of the following Directives:

- **Directive 2014/35/EU (Low Voltage)**
- **Directive 2014/30/EU (Electromagnetic Compatibility)**
- **Directive 2006/42/EC (Machinery)**
- **Directive 2011/65/EC (RoHS)**

Designation of the product:

**Multigas leak detector**

Models:

**ECOTEC E3000  
ECOTEC E3000A  
ECOTEC E3000RC**

Applied harmonized standards:

- **DIN EN 61010-1:2011**
- **DIN EN 61326-1:2013**  
**Class B according to EN 55011**
- **DIN EN ISO 12100:2010**
- **DIN EN 50581:2013**

Catalogue numbers:

**530-001, 530-002  
530-101, 530-102  
530-103, 530-104**

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# Index

|   |        |
|---|--------|
| <b>A</b>  |        |
| Accessories                                     | 86     |
| Alarm delay                                     | 33     |
| Alarm profile                                   | 34     |
| Ambient conditions                              | 17     |
| Ambient temperature                             | 17     |
| Audio settings                                  | 34     |
| <b>B</b>  |        |
| Basic settings                                  | 32     |
| <b>C</b>  |        |
| Calibrate                                       | 43     |
| Calling up and managing maintenance information | 71     |
| Capillary filter                                | 20     |
| Connect to PLC                                  | 25     |
| Connect with PC                                 | 25     |
| <b>D</b>  |        |
| Declaration of Contamination                    | 83, 84 |
| Dimensions                                      | 16     |
| Display and keys                                | 27     |
| Display settings                                | 35     |
| <b>E</b>  |        |
| ECO-  | 23     |
| Ecotec E3000RC                                  | 31     |
| Electrical data                                 | 16     |
| Error list                                      | 71     |
| External display unit                           | 24     |
| <b>F</b>  |        |
| Factory settings                                | 18     |
| Function allocation                             | 27     |
| Function symbols                                | 28     |
| Fuses   | 16     |
| <b>G</b>  |        |
| Gas equivalents for helium and hydrogen         | 46     |
| Gas library                                     | 87     |
| <b>H</b>  |        |
| Headphones connection                           | 13     |
| <b>I</b>  |        |
| I/O port  | 13     |
| Idle state                                      | 57     |
| IGS   | 48     |
| Interfaces                                      | 38     |
| <b>L</b>  |        |
| Language selection                              | 32     |
| Leak rate filter                                | 33     |
| <b>M</b>  |        |
| Maintenance work                                | 74     |
| Measure   | 50     |
| Measured value limit                            | 15     |
| Measurement display elements                    | 29     |
| Measuring with IGuide                           | 52     |
| Mechanical data                                 | 16     |
| Menu tree                                       | 98     |
| <b>N</b>  |        |
| Nameplate                                       | 13     |
| <b>P</b>  |        |
| Physical data                                   | 17     |
| Power consumption                               | 16     |
| Pressure unit                                   | 33     |
| Protection class                                | 16     |
| <b>R</b>  |        |
| Relative humidity                               | 17     |
| Retrieve information about the device           | 57     |
| Return shipment                                 | 83     |
| RS-232 connection                               | 13     |

---

**S**

|                                      |        |
|--------------------------------------|--------|
| Scope of delivery                    | 10     |
| Select gas                           | 40     |
| Self-test                            | 26     |
| SERVICE                              | 57     |
| Setting Custom Gas                   | 49     |
| Setting date and time                | 33     |
| Setup                                | 19     |
| Sniffer handle                       | 15, 31 |
| Sniffer light                        | 33     |
| Special features of individual gases | 61     |
| Standard factor                      | 49     |
| Storage temperature                  | 17     |
| Supply voltage                       | 16     |
| Suppress interfering gases           | 48     |
| Switch off                           | 63     |

---

**T**

|                      |    |
|----------------------|----|
| Transport protection | 20 |
|----------------------|----|

---

**V**

|                           |    |
|---------------------------|----|
| Vacuum and access control | 36 |
|---------------------------|----|

---

**W**

|                            |    |
|----------------------------|----|
| Wake up                    | 33 |
| Warning and error messages | 64 |

---

**Z**

|      |    |
|------|----|
| ZERO | 36 |
|------|----|







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